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TRANSACTIONS

OF THE

TYNESIDE

NATURALISTS' FIELD CLUB.

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TRANSACTIONS

OF THE

TYNESIDE NATURALISTS' FIELD CLUB.

ADDRESS TO THE MEMBERS OF THE TYNESIDE NATURALISTS' FIELD CLUB,

READ BY THE PRESIDENT, THE REV. WILLIAM GREENWELL, M.A., AT THE SEVENTEENTH ANNIVERSARY MEETING, HELD ON THURSDAY, THE 19TH OF MARCH, 1863.

GENTLEMEN—I feel that some apology is due from me, in addressing you as President of a Naturalists' Field Club, when I can lay claim to no greater acquaintance with any branch of Natural History than is possessed by most persons of education at the present day.

My apology is, that I address you as an archæologist, for it is to my knowledge on matters connected with that science, that I owe the distinguished honour of having been elected President of so flourishing a society as the Tyneside Naturalists' Field Club. It may at first sight seem strange, that as Naturalists you should have elected an archæologist for your President, but the anomaly is more apparent than real, for like all other Naturalists' Field Clubs, the Tyneside has always devoted much consideration to subjects connected with the antiquities of the district. And, indeed, such a conjunction of subjects for investigation could scarcely be avoided, when we visit, at almost all our meetings, places as remarkable for the handy-work of man, as for the natural products with which man works and makes. And I must here be allowed most strongly to impress upon our

members how desirable it is, that they should foster an interest in the relics of our ancestors, and of the early inhabitants of our country; subjects of the deepest moment and of the most enticing character, which relate to the social condition, the knowledge of art and manufacture, the habits and religion of the different races, which have occupied this district, and whose remains are found so abundantly when once our attention is drawn towards them. Had societies like our own been in existence some years ago, what treasures of architecture, of sculpture, of painting, and of various arts might have been preserved, which are now for ever lost to us! And it is one great use of a Club like ours, that a taste for such pursuits is generated, and that a knowledge is acquired, which, whilst it gives ourselves great pleasure, leads us to preserve for others, and for future ages, those most valuable records which time has still left us. And indeed, on subjects like these, almost unlimited opportunities are afforded us, for the district, over which our Club extends its visits and researches, is rich beyond measure in ancient remains. Of the works of those tribes which occupied the land before the Roman invasion, there are found most perfect examples in their fortified places, and in their dwellings, in their peculiar mode of terraced cultivation, and in their manner of sepulture, as shown in the numerous tumuli which still exist untouched by the plough. Of the same people we have the mysterious circular markings on rocks and stones to be more fully considered later on, and great numbers of weapons and implements of stone, bronze and iron, as well as specimens of fictile manufacture and of personal ornaments.

Of Roman civilization and power we have relics unsurpassed by any other part of England, for though we have no large and wealthy city to excavate like Wroxeter *(Uriconium)*, we have, besides numerous military stations and ways, that gigantic work of Roman skill and energy, the wall of Hadrian, with its several adjunctive forts, so learnedly, and at the same time so popularly illustrated by our fellow-member Dr. Bruce. And here I cannot but most cordially thank him for that work, than which I know none more ably, none more completely

executed, and withal, with such simplicity and clearness as to make it a book, which, unlike many on such subjects, may be read with pleasure by all.

Of Anglo-Saxon date we have not so much to occupy us as is afforded by some other districts in England. We have no cemeteries like those of Kent, rich in goldsmith's work of high artistic merit, or of East Anglia, with their sepulchral urns, weapons, implements and ornaments. Yet we are not without objects of deep interest of those times. We have the remarkable crypt at Hexham, almost a repetition of one in Ripon Cathedral, certainly of Bishop Wilfrith's building,* and near to which was discovered, in 1832, a large quantity of Northumbrian money, some thousand stycas of the kings Eanred, Ethelred, and Redulf, and of the archbishops Eanbald and Vigmund; we have also several fragments of crosses of Anglo-Saxon date and work, especially two almost complete ones at Aycliffe, the monk's stone near Tynemouth,† and portions of two or three at Hexham.‡ Some remains of what has been called Anglo-Saxon architecture exist at Norton, Billingham, Monk Wearmouth, Jarrow, Ovingham, Bywell St. Andrew's, Corbridge, Whittingham, and other places, but it is impossible to say decidedly whether these remains are of pre-Norman times, certainly if not of a date before 1066, they are of one very soon after. A few scattered burials of the Anglo-Saxon period have been discovered; one, a cemetery, supposed to have been attached to a monastic body at Hartlepool, where, with the skeletons, were found several remarkable grave-stones, with the names of the persons interred engraved upon them, in some cases in runes; another at Castle Eden, with which occurred a glass vase of curious shape and make, specimens of which have been also found in Kent and Gloucestershire, and in a Frankish place of interment at Selzen near Mayence; another at East Boldon, with which was found a bronze pendant article,

* Wilfrith, consecrated Bishop of York, A.D. 664, was a great church builder. He restored the church which Paulinus had built at York, covering the roof with lead, and filling the windows with glass, till then unused in England. He built also the churches at Ripon and Hexham; both extraordinary works for that time.

† Probably one of the boundary stones of the Anglo-Saxon sanctuary.

‡ It is quite possible that the two fragments, in the possession of Mr. Fairless, are portions of the crosses which stood at the head and foot of the grave of Acca.

ornamented with coloured glass, set in gold. The only burial that has come under my own notice was a sepulchral barrow at Camboise, removed last year, in which remained several bodies, with one of which was associated an enamelled bronze fibula and bone comb, both of undoubted Anglo-Saxon work. I hope to be able to give a full account of this discovery in our Transactions.

But the field widens when we come to mediæval times. In remains of ecclesiastical and civil buildings the district abounds. The cathedral church of Durham, with the remains of the various monastic buildings there, may claim the first place, and we have noble examples of the skill and taste of our early architects in the conventual buildings of Finchale, Tynemouth, Hexham, Brinkburn, Hulne, and Holy Island, and in St. Nicholas' Newcastle, Darlington, Staindrop, St. Andrew's Auckland, Hartlepool, Lanchester, Easington, and numerous other most valuable examples of collegiate or parochial churches.

As might be expected, from the neighbourhood of the borders, in castellated buildings, the two counties of Northumberland and Durham afford remarkable instances; without considering Norham, which is rather beyond our limits, there are the great castles of Alnwick, Warkworth, Newcastle, Prudhoe, Durham, Raby, and Barnard Castle, and the smaller ones of Chillingham, Edlingham, Bothal, Langley, Houghton in Tynedale, Witton on the Wear, Ravensworth, and Brancepeth, the two last containing valuable portions of old work, though sadly barbarised by modern so called Gothic alterations and additions. Abundant instances of the fortified houses of the smaller gentry are found in the Peel houses, among which may be mentioned Cockle Park Tower, Morpeth, Hexham, Bellister, Blenkinsopp, Thirlwall, Cocklaw, Halton, and Belsay, and many others still remaining in a more or less perfect state. Ayden Castle is a choice and perfect specimen of a fortified manor house of early date; and Lumley and Hylton Castles, the embattled residences of two of the oldest Durham families, afford us instances of buildings which do not quite fall into the list of castles or Peel towers. Some interesting fragments, little known, remain at Hollingside near Whickham, the old residence of the Hardings. Bishop Auckland possesses, in the palace of

the old Counts Palatine, many fragments of architectural interest, among others the fine, though mutilated chapel, built by Bishop Beck, and in Newcastle and other places we find here and there examples of the houses of the sixteenth and seventeenth centuries. In Seaton Delaval, where is also, closely adjoining the house, a small early chapel, we have a noble example of the artistic skill of Vanbrugh, the greatest architectural genius who adorned the eighteenth century.

All these are within our reach, and cannot fail to give an additional zest to our meetings, whilst we are led to admire therein the skill and science of our forefathers, and by considering their interior domestic arrangements, and exterior capabilities for defence, we are enabled to obtain some insight into the social habits and manners of the people who lived in them, and to judge of the relations in which they lived with their neighbours on both sides of the Tweed.

But to go back to a period incalculably earlier than any to which I have already referred, to show how intimately archæology and the natural sciences are connected, I need only draw your attention to the question which is now causing so much discussion,—that of the antiquity of man upon the earth. The most curious discoveries of flint implements, of human manufacture, in the drift, associated with remains of animals which have not existed within historic times, has led to much controversy, but as yet the facts are too scanty to allow any decided conclusion to be arrived at. Of one thing there can be no doubt, that the implements in question are of man's handywork; anyone who has seen them might as well say that the steel pen he writes with was accidental, as that these remarkable relics are formed by natural fracture and cleavage. Nor indeed can I see any ground for a denial of the fact, that the animals, whose remains are found in the drift, and the people who produced the flint implements were coæval. It does not appear on most careful examination, by competent and various geologists, that the deposit in which they are found is a secondary one, caused by the breaking up of two distinct strata, each of which had its several and separate remains, or, as it has been asserted, that the flint implements have worked down to the lower stratum in which

they are now found, from a higher one in which they had been at first deposited. On the contrary, all the investigations which have taken place shew, most distinctly, that the human and animal remains have been laid side by side at the same time and by the same agency. The great question which has yet to be settled is this—at what period was the drift in which the flints are found deposited? And side by side with this is another important query—down to what time did these now extinct animals occupy any part of our continent? Unquestionably the time of this deposit was a very remote one, to speak in an historical and not a geological sense. Near Abbeville the flints and bones are found some fifteen or twenty feet below the surface, whilst Gallic and Roman remains, deposited some 2000 years ago, are found a few feet from the present level of the soil, above the undisturbed stratum, which contains these still more ancient relics; that stratum bearing unmistakeable evidence, from its position with regard to the present level of the river basin in which it exists, and from other geological facts, such as the appearances of ice-action, of a vast lapse of time having occurred since its deposit. In our own country, under very similar circumstances, the like remains have been found. In Gray's Inn Lane, London, at Reculver in Kent, in Bedfordshire, and more especially at Hoxne in Suffolk, many flint implements, identical with the French specimens, and like them associated with bones of *Elephas primigenius*, *Rhinoceros tichorhinus*, *&c.*, have been found in beds, posterior to the deposit of the glacial period, named the boulder clay. In caverns also, the same implements and also human bones have been found, both on the continent and in England, associated with the bones of animals, long since extinct, such as the cave bear (*Ursus spelæus*), the cave lion (*Felis spelæa*), the mammoth, (*Elephas primigenius.*) We have lately had a discovery, at Heathery Burn Cave, near Stanhope, of human and animal remains associated together, and alike enclosed beneath a layer of stalagmitic matter, but in this case the bones are of animals which inhabited our district to within a few centuries ago, such as the wolf, the wild boar, and roe-deer, and the implements of human manufacture are of a date scarcely earlier than our era, and probably of one a century or two later. I have

in preparation a full account of this valuable find, which I hope before long to bring before our Club.

The attention of our members being drawn to this subject, I think it probable that some facts may occur in our own district, which will bear upon this most deeply interesting subject. It is not impossible that in deposits, within our limits, similar to those in which they have occurred in France and in the south and other parts of England, some of these singular implements may be found, and I trust our members will keep their eyes and ears well open to any discovery of flint articles, whether they be of the ruder kind, like those above mentioned, or of the more elaborate and highly polished kind, the relics of a much later yet still early period.

Having justified, I hope, the appointment of an archæologist to your Presidential chair, I will now pass to a short account of the various places we visited and the objects we noted on our field meetings during the past year.

The First Meeting, on May 29, was at Finchale Abbey and Durham. The members met at the Leamside station of the North Eastern Railway, and from there walked to Finchale, crossing the river Wear by a colliery railway bridge, a few yards below which are the remains of the first habitation of Godric, the saint of Finchale. Bishop Flambard, about the year 1110, had granted this spot to Godric, who, having been merchant and sailor and having visited many holy places, among others, Jerusalem, at last settled down to a life of the most complete mortification and solitude, literally fulfilling the command to sell all he had, and give to the poor, and follow Christ. No more remarkable instance of the ascetic can be found in the whole annals of christian heremitical life than that of Godric; he lived here, cultivating the small plot of ground, whence he obtained his sustenance, subject to the inroads of wild beasts and of men not less savage, to the flooding of his hut by the overflowing of the Wear, and adding, to all these miseries from without, the self inflicted torments of flagellations, vigils, of coarse and unwholesome food, for he mixed his half-crushed grain with ashes, and never eat the herbs, which he gathered round his dwelling, until they became fetid by long keeping. The stone, which served

him for a table, became his pillow during the short intervals he allotted to sleep, and whole nights were passed by him, during the frosts of winter, immersed up to his neck in the half frozen river. He died in 1170, having removed to the site of the present ruin, sometime previously, on account of its more favourable position. Bishop Flambard had, before his death, granted the place to the monks of Durham, and two of the body had occupied the cell after Godric's death. On the failure of Henry Pudsey, son of Bishop Pudsey, to establish a monastery, in connection with the Augustinian church of Gisborough, at Baxtanford, on the Browney, about a mile from Durham, he transferred, in 1196, the land, which he had granted to those ecclesiastics, to Finchale, and hence arose the establishment at that place. Finchale,* deriving its name from the corner or elbow of the river on which it is situated, possesses that beauty of position which characterizes most monastic places. To secure warmth, shelter is required, and hence steep rocky banks, clothed with wood, so frequently hem in the buildings; a river is almost demanded by the requirements of a monastic body, for fish formed a staple article of their food,† and hence to the charm of rock and foliage is added the soft murmuring of streams, and the placid reflection of sky, clouds and sunshine in the still waters.

Of the original building, of Norman times, nothing was ultimately retained but the tomb of St. Godric, which was situated under the large window at the east end of the south transept, built in 1266. The ruins, as they now exist, are the remains of the building commenced in 1242 and finished about 1268, and form a valuable specimen of the architecture of that day, though of a very

* Most of our old towns possess a Fenkle or corner street.

† The river Wear then abounded in salmon, for no impassable lock existed at Lumley, and the streams were not polluted with lead and coal washing, or by the foul overflowing of collieries. Now that the question of re-stocking our rivers with that most valuable and delicious fish, the salmon, occupies so much attention, a few notes as to the quantity of fish that was formerly taken in the Finchale fishery may not be without use. In 1348 the monks sold fish to the amount of £9 12s. 8d, and this we must remember was over and above the consumption within the house; in 1355 they received from the sale of salmon £11 2s. 1d., and to show the value of money in the same year, for three cows and a bull they received 32s.; in 1358 for salmon £12 5s. 6d., and for a cow and a calf 10s.; in 1438 £16 for salmon; and in 1441 £14 6s. 3d. for salmon, whilst for 35 quarters 3 bushels of barley, and 42 quarters 4 bushels of oats they gave £6 11s. 6d.

simple and unornate kind. Soon after the erection of the church, the aisles, for some cause, which we cannot now understand, were removed, and the arches being blocked up, windows of a date about 1365 were inserted, one of which still remains. Several relics of the domestic part of the monastery, and of the Prior's lodging, of various dates, exist, more or less perfect, and the old park wall, with its characteristic masonry, and some traces of the entrance gateway, are found to the south of the buildings.

After leaving Finchale, the members proceeded up the stream of the Wear, by Kepier Wood to Durham, passing through wooded glades, rich, at their various seasons of flowering, in the scarlet lychnis, the veronica, myosotis, wild garlic, and hyacinth.

The site of Kepier Hospital, founded by Bishop Flambard in 1112, was visited.* The only portion of the building which is left is the gateway, a piece of fourteenth century work, in which was noticed, in a row of sunk quatrefoils above the archway, the remains of coloured plaster, a very unusual feature in English work.

At Durham the members visited the Cathedral and Castle, which are both too well known to require comment, and which would, if noticed at all, require more space than the limits of my address allow. In the library attached to the Cathedral they inspected the large collection of Roman altars and inscriptions from various stations in the district, and the very valuable articles of Anglo-Saxon date, taken from the tomb of St. Cuthbert, amongst them the gold pectoral cross, probably a reliquary, and a portable altar, both personal relics of the saint. The cross is a choice specimen of Anglo-Saxon goldsmith's work, and is of the same style of workmanship as some of the rich broaches found in the Kentish cemeteries. The beautiful stole and maniple of embroidery, worked by command of Aelfled, the consort of Edward the Elder, for the use of Frithestan, Bishop of Winchester, were also noticed: they are of a date not later than 915, and afterwards, in 934, were given by King Athelstan to the body of St. Cuthbert

* The place takes its name from the Yare or Wear, the dam, which there was built across the river, and which contained the trap for kepping (catching) the fish.

when he visited Chester-le-Street, in that year.* In the manuscript closet was seen the valuable collection of MSS., part of the ancient library of the monastery, and containing admirable specimens of the art of illumination from the ninth century to the fifteenth.†

About sixty members dined at Mrs. Hall's in Silver Street, when fifteen new members were elected.

The Second Meeting was held at Felton, on June 26th. The members assembled at the Acklington Station, and proceeded, crossing the Coquet by a ferry, to the ruins of a small ecclesiastical building, now called Brainshaugh Chapel, and which is the old church of Guyzance. It is pleasantly situated on a piece of haugh land, bounded by the Coquet and wooded banks, and consists of a nave and chancel, both of small pro-

* Among the vestments taken from the coffin of St. Cuthbert are several fragments of silk fabric, which are of an early date, and of apparently oriental manufacture. The pattern has certainly nothing of an Anglo-Saxon or mediæval character about it, but bears a strong resemblance to eastern design.

† Among the most valuable MSS. may be mentioned an imperfect copy of the Gospels [A. II. 17] of the 8th century, with illuminations of Irish character, and containing also a few pages of the gospel of St. Luke, in uncials, of a date not later than the early part of the sixth century; a copy of the Gospels [A. II. 16], and of Cassiodorus on the Psalms [B. II. 30], both traditionally said to be in the handwriting of the Venerable Beda, and both containing ornamentation of Anglo-Saxon character; a copy of the Vulgate [A. II. 4], of which only the second volume now remains, and which, among other MSS., was given by Bishop Carileph to the monastery, it contains many initial letters, formed of grotesque animals and foliage, of a particularly free and graceful kind; a copy of the Bible in four volumes, [A. II. 1] in the original stamped leather binding, given by Bishop Pudsey, and written probably about 1170, this magnificent book has suffered greatly from most of the illuminations having been cut out, but enough remains to show its former splendour, at the beginning of Maccabees is a picture, which contains valuable illustrations of the armour and dress of the period; a copy of St. Paul's epistles, [A. II. 19] given by the same prelate to the monastery, and probably written and illuminated by the same scribe and artist who produced the Bible; a Psalter, [A. II. 10] of a date about a hundred years later than the last MS., it contains many paintings of a very graceful and delicate character, of good design and drawing, and, in its innumerable initial letters, it shows a power over the pen, in the production of free hand drawing, which I have rarely, if ever, seen equalled; a copy of the Bible [A. II. 2], of a date a little later than the Psalter, is full of very beautiful illuminations, rich in varied diapered back-grounds of excellent colour and pattern; a copy of the Decretals and other legal tracts, [C. I. 14,] of the beginning of the fourteenth century, contains in its numerous initial letters designs of the most varied and artistic kind, three or four pages are filled with emblazoned heraldic coats, and it may, in some respects, be set down as the finest MS. in the collection. Berchorius Repertorium Morale, &c., [A. I. 17, 18, 19,] a MS. written in 1395, has a few large flowing initial letters, by different artists, very rich in colour and design, but shewing a decline of taste in its too meretricious style, and in a want of the severity of earlier work.

portions, the first especially so, enclosed in a piece of ground, walled off, and which is still used as a burial place. The earliest part of the building is very late Norman, and a stone of that date, sculptured with vertical lines of nail head ornament, either the capital of a column, or more probably the base of a font, still exists in the churchyard. There are indications of early fourteenth century work, in the south wall of the chancel, where are the remains of a piscina and a doorway; other fragments of mouldings of the same date are scattered about in a wall, which forms the west boundary of the field, in which the ruin stands. This little church, that of St. Wilfrid of Gysnes, was given by Richard Tyson, the son of the standard bearer of the Conqueror, the first Norman Lord of Alnwick, to Alnwick Abbey, in the twelfth century, and is made the text of a very valuable essay on the family of Tyson and the heirs of his Northumberland fee, by Mr. Longstaffe.*

Leaving Brainshaugh, the members walked, along the thickly wooded and picturesque banks on the north side of the Coquet, to Felton. During this route some interesting plants and insects were observed, but nothing which calls for particular notice. At Felton the church was visited, which is in a very bad state, and shows none of that care, arising from a true feeling for such buildings, which characterizes the present day. It is principally in the style called early English, and may date about 1220. The nave is entered on the south side through a porch, which possesses its old stone ribbing. The north aisle is modern, and in very bad taste, the south aisle is separated from the nave by early English arches, and is lighted at the east end by a five lighted geometric window, which has evidently been brought from some other building, tradition says Brinkburn Priory. The head of this window is cut out of a single stone. The east window of the chancel is modern, and the south side is lighted by three original lancet windows, which are trefoil headed in the interior splay. There are the remains of lancet windows, now blocked up, at the west end of the nave. After leaving the church, the members, by the kindness of Mr.

* Published in the Archæologia Aeliana, New Series, vol. III. p. 129. See another notice of the church by Mr. Seymour Bell, Archæologia Aeliana, vol. IV. p. 1.

Riddell, visited the park and the chapel attached to his house. In the garden was seen a fine collection of plants from Japan, remarkable for the peculiar and striking beauty of the leaves. The Club are indebted to the Rev. Mr. Hall, the chaplain, for his courtesy in showing the chapel, and explaining the objects of interest which it contains. Dinner was provided at Miss Hind's, when six new members were elected.

The Third Meeting was at Hexham, Chollerford, and St. Oswald's, and was held on July 18th. The members assembled at Hexham, and thence proceeding along the south bank of the Tyne, crossed the river to the north side by the bridge of the Border Counties Railway, and followed the line until they came to the abutment of the Roman bridge opposite the Chesters. In a cutting, through which the railway is carried, were seen instructive sections of the glacial drift, and many specimens of polished and striated pieces of limestone were observed in the clay of which the drift consists, showing unmistakeable evidence of their having been set, so to speak, in ice, and subjected whilst so embedded to a lengthened course of attrition, which had given them almost the polish of glass, and then scored deep lines on the polished surface. The abutment of the Roman bridge, lately discovered by the discernment of Mr. Coulson of Corbridge, and laid bare at the expense of Mr. Clayton, affords a good specimen of Roman masonry, solid and strong, and having many points of resemblance to the best work of our railway bridges. There are many curious details connected with this abutment, which it would require a very careful examination to understand thoroughly, but they may be safely left in the hands of Dr. Bruce, who is engaged, I believe, on a paper for the Archæologia Æliana on the subject. The members had the advantage of Dr Bruce's presence when they visited this valuable relic, and he most courteously and carefully pointed out all its remarkable features. On the lowest part of the work occurs, in bold relief, a large priapic symbol. After leaving the bridge the members walked up the bank of the Tyne to Chollerford, and here they divided into two sections, the one went to Chesters to inspect the valuable collection of Roman antiquities in the

possession of Mr. Clayton, and to see the remains of Cilurnum, whilst the other mounted the hill, following the course of the wall, to St. Oswald's. On the road to St. Oswald's, by the kindness of Mrs. Lee, the party saw, in her grounds at Brunton, a fragment of the wall in good preservation, and also a Roman altar. The church of St. Oswald's is a modern and unimposing structure. It occupies the site of the church built on the spot where King Oswald erected the cross, before the battle, when he defeated and slew the British leader Cædwalla, the son of Cadvan, and Prince of Gwywedd. The place where this battle, which according to Beda occurred A.D. 635, was fought, has been a fertile subject of controversy. Beda tells us that it was at Denisesburn,* a locality not now to be identified under that name. The field of battle was, without doubt, situated at no great distance from the place where Oswald erected the cross, and more than one place, near adjoining, has been fixed on as the battle field.† A charter of the thirteenth century, granting lands to an Archbishop of York, seems to fix the place on the south side of the Tyne, and up the Devil's Water, that is, if we may allow the name Denisesburn to settle the point. The locality thus designated in the charter is certainly at no great distance from St. Oswald's, and though we might from Beda's account, have looked for the battle field nearer to the wall, yet the name

* Nennius calls this battle Catscaul, "Ipse est Osuuald Lannguin, ipse occidit Catgablaun regem Guenedotæ regionis in bello Catscaul, cum magna clade exercitus sui." Nennius Ed. Stevenson p. 64. The Annales Cambriæ, which places the battle under the year 631, contains the following entry: "Bellum Cantscaul in quo Catguollan cum suis corruit." The name Catscaul has a probable derivation from the Welsh *cad*, a battle, and *gwal*, a wall or barrier, and so may mean the battle at or near the wall, which certainly corresponds with the place of Oswald's victory.

† The site of the battle has been generally considered to have been necessarily, to the north of the Roman wall, but for this there is no sufficient authority. Beda tells us that Oswald, about to engage in battle, erected the cross at a place near to, and north of the wall, but he does not say that the battle was fought on the spot. *Heven-felth*, heaven-field, which he mentions in connection, refers, I think, to the locality where the cross was erected, and where the battle, may, figuratively, through that erection, be said to have commenced, and not to the site of the actual battle. Smith in his edition of Beda, in the appendix No. 13, considers the Erring Burn to have been the Denisesburn of Beda, and that the battle was fought near Bingfield, which he says was traditionally the ancient Heven-felth. All these traditions and the belief that the battle occurred to the north of the wall, have probably their origin in the fact that there Oswald, before the battle, erected the cross, but afford no sure evidence as to the site of the actual engagement.

Denisesburn must be held, I think, almost conclusive on this point, for it is very unlikely that there should be in the same neighbourhood two places of that name. The charter contains the following entry :—" Know ye that I, Thomas de Whittington, have granted to Walter, Archbishop of York, a third part of Hoggesty, which I hold by the gift of Ranulph de Porchet, and for this grant the Archbishop of York has given to me in exchange twenty acres of land out of his waste in Ruleystal, between these bounds, to wit, between Deniseburn, and Divelis (Devil's Water), beginning on the east part upon Divelis and ascending to the great road which leads as far as to the forest of Lilleswude."* I believe the name Deniseburn is not now known on Devil's Water, but the locality mentioned in this charter would not be difficult to identify, and it would be well worth the time for any of our members, resident in that neighbourhood, to make out the place. It would be beyond the limits of my address to enter more fully into this question, which demands a separate paper for its consideration. The subject is undoubtedly one of very great interest, as it concerns most nearly the establishment of Christianity in the north of England; for had Oswald been defeated, it is possible that the spread of the Christian faith might have been retarded for many years, and the whole of Northumbrian history altered. By the death of Cædwalla, one of the greatest of the British princes, and who had, in many battles, shewed his own prowess and the valour of his followers, and so gained possession of a considerable portion of the land held by the Anglo-Saxons, Oswald recovered his parental kingdom of Bernicia, and he added to it Deira, to which he was entitled through his maternal descent from Aella. He became the sixth Bretwalda, and through his influence Christianity became firmly established in his dominions. Brought up in his

* The charter is taken from the British Museum, Lansdown MSS. 402, 19. It s endorsed " Carta Thomæ de Widington de tercia parte de Hogesty," and contains the following extract:—"Omnibus &c., Thomas de Whitinton salutem. Noveritis me concessisse Waltero Ebor. Archiepiscopo terciam partem de Hoggesty, quam tenui de dono Ranulphi de Porchet, de qua cartham suam habui. Pro hac concessione dedit mihi dictus Archiepiscopus in escambium xx acras terræ, de vasto suo de Ruleystal, inter istas divisas: videlicet, inter Deniseburn et Divelis, incipiendo, ex parte orientali, super Divelis, et ascendendo ad magnam viam, quæ ducit usque ad forestam de Lilleswude."

youth among the Scots, he introduced from Hii or Iona, the island of St. Columba, the holy Aidan, whom he placed at Lindisfarne, and who became the great promulgator of the Christian faith in Northumbria.

After leaving St. Oswald's the party wandered across Fallowfield Fell, whence was seen a most magnificent and varied prospect down and across the valley of the Tyne. The scene was most characteristic of our northern country, the river winding through rich alluvial tracts, teeming with agricultural wealth, its banks in many cases well wooded, rising abruptly from the plain, and broken here and there by a narrower outlet, through which came down from the uplands several tributaries of the Tyne, these uplands gradually rising into a higher and colder range of temperature, until extensive fir woods gave place in the distance to the broad sweep of ling and moorland. All these formed a scene of varied beauty, and viewed under the aspect of mingled sunshine and shadow, possessed a charm which few landscapes could surpass. We looked down on Dilston, the crumbling relic of the unfortunate Earl of Derwentwater, on Corbridge with its early church, and the almost obliterated traces of its Roman station, on Hexham with the grand remains of its ancient abbey, and two mediæval towers shewing above the roofs of the quaint old town; Ayden Castle might just be traced nestling among the trees, on the brink of the sweet dell on which it is placed; whilst the ear was filled with the murmur of summer bees, and the soft sighing of the wind playing round the knolls, covered with heath and bracken, among which we stepped. We could picture the delight with which the citizen of ancient Rome gazed on the scene, then as beautiful as now, and which perhaps recalled to him some other view, and some sunnier plain in the distant land of his birth, whilst we looked on the time-worn stone on which he had engraved the record of visits so constant, that he identified the rock with himself. Petra Flavi Carantini, the rock of Flavius Carantinus, still remains to tell us that here, centuries ago, one of that mighty people, on whose civilization all modern states are based, and which has given a language to three of the great nations of

Europe, once sat, and might have thought on the power and extent of a dominion which only our own country has equalled.

Leaving Fallowfield, the party descended the other side of the hill, and thence, obtaining on the way a fine view of North Tyne, and the valley of the Erringburn, to Cocklaw, a good example of the Peel tower, and formerly a stronghold of the old Northumbrian family of Errington. Here, in a small chamber attached to the principal room of the tower, were seen the fading remains of rude fresco paintings, with which, in times when no wall papers were in existence, and when hangings were expensive, many of the rooms of such buildings were decorated. From Cocklaw Tower, the members proceeded by a pleasant route, to the George Inn at Chollerford Bridge, where they dined, and three new members were elected. A memorial to the Lords of the Treasury, praying that the old Chapter House of Westminster, in which many of our early Parliaments were held, and which is architecturally of the greatest value and beauty, should not be again used as a Record Office, was extensively signed by the members present. It is much to be hoped that the desecration of this splendid building may be stopped; it has been shown to be quite unfit for such a purpose as the keeping of Records, and it is most desirable that a work of such historic interest and artistic merit should be restored to its former splendour, by the taking away of the presses which conceal its features, and which render it quite unappreciable by the few who now visit it. And one great end which is served by a society like ours is, that through a consideration of local interests, we are led to those which are general, and whilst doing what we can to preserve the early remains of our own district, we may help, as far as we are able, to stop the destruction of public monuments, and to restore them to their proper and general use.

The Fourth Meeting was held August 18th and 19th, in the neighbourhood of the Breamish. At this, the most interesting of our meetings, I was unable, through an accident, to be present. I am indebted to our late esteemed secretary, Mr. Mennell, and to Mr. Langlands, a member of our parent club, the Berwickshire, for very full notes of the different objects which were seen on that occasion.

The members started from Alnwick, and drove to Glanton, where they breakfasted ; they then drove to Ingram, one of those ancient and remote villages, which are almost beyond the limits of cultivation, and of which the west and north-west parts of Northumberland present many examples. Ingram has been a much larger village than it is at the present day; the remains of many foundations of houses were observed round the village, giving evidence of a place of more importance than it is now. This is also shown by the base of the village market cross, which still remains on the green, and by the much larger number of burials, recorded in the parish register of the seventeenth than in that of the nineteenth century. The same register contains a curious entry,* showing the operation of a statute of Charles II.† for the encouragement of the woollen manufacture. The statute enacts "That from and after the first day of August 1678, no corpse of any person shall be buried in any shirt, sheet, shift, or shroud, or anything made or mingled with flax, hemp, silk, hair, gold, or silver, other than is made of wool only, on pain of five pounds. The fourth clause of the Act orders an affidavit to be made within eight days after burial that the person was buried in woollen."

Near Ingram, on the green hill called Heddon, to the south of the camp on that hill, were observed the traces of several lines of terrace cultivation. This system of early husbandry is no doubt to be attributed to those tribes whose fortified places of abode abound on all the neighbouring hills. The terraces correspond, in some respects, with the artificial platforms on which the vine is commonly grown on the banks of the Rhine. They usually face towards the south, so as to get the full power of the sun, and on them were raised the vegetables and cereal crops, which formed a small portion of the food of the British tribes of Northumber-

*February 6, 1682. Isabella Wright, the child of George Wright, of Revely. An affidavit in writing, under the hand and seal of Ann Robertson, that the said Isabella Wright was not wrapped up or buried in anything mingled with flax and other materials,but sheep's wool only, as also a certificate under the hand of Arthur Elliott, clerk, before whom the said affidavit was made, were brought the day and year aforesaid. ACQUILINA FORSTER.

†30 Charl. II., c. 3.

land. This system of cultivation, exceedingly limited as it is, probably produced all the vegetable diet of that people, for the low-lying land by the beds of the streams was then subject to constant overflow, during times of flood, and was, doubtless, covered with a thick growth of underwood. The hills, in a great part, were clothed with forests, which supplied shelter and food for the wild animals, which formed the great staple of food for these rude hunters. The constant occurrence of horns of the red deer, and the remains of other wild beasts in the tombs of these tribes, shows us how important an element in their dietary were "*ferœ naturœ*." Very well marked instances of these terraces occur on the Colledge burn, near Hethpool, and at Stanhope, and I have seen them near the source of one of the feeders of the Whittle Dean Water Works, west of Ryall, they exist in many other places, but it may suffice to mention these. On leaving Ingram, the first place visited was the camp near the Prendwick boundary; this is circular, and has a double ditch surrounding it. Around and protected by this fortified place, are the remains of considerable foundations of hut circles, more perfect examples of which were seen at Greaves Ash. From thence the members proceeded to Brough Law, a very strong and extensive fortification. The rampier, now very much ruined, and appearing, at first sight, a mere confused mass, is formed entirely of stones, in this respect corresponding to the large enclosure on the summit of Yevering Bell. The walls have originally been carefully and regularly constructed, and through the liberality of the Duke of Northumberland, who provided the funds for the excavation, some portions of the wall can now be seen as it was first constructed. The camp is situated on the south side of the Breamish, to which stream the ground falls away in a very steep descent, covered with loose rolling stones, here called *glidders* or *glitters*.* The natural position is also strong to the west and east. The view from this place is very extensive, commanding a wide range, and it is one of the most interesting fortified places in the district.

Proceeding up the valley of the Breamish, the next place

* A. S. *Glidan*, to slide.

visited was Greaves Ash, where the fortified strongholds, and numerous remains of hut circles were inspected. These have been most systematically and carefully excavated, under the care of Mr. Tate, the secretary of the Berwickshire Field Club, and at the expense of the Duke of Northumberland. From this exploration the most valuable results, as regards the mode of life and the nature of the dwellings and the defences of the British tribes, have resulted. An admirable account of these forts, and the town adjacent, has been drawn up by Mr. Tate, and is published in the Transactions of the Berwickshire Field Club, for 1861, and to this paper I must refer our members for full information on this very curious subject. The town, to call it by that name, has consisted of three separate, and yet connected parts, within which are found the foundations of the circular huts, made of stones, and upon which rested the wood joists, which coming to a point in the centre and covered with turf or straw, formed the rude habitation of the people who built this town. Similar fortified places of habitation occur in Devonshire, Somersetshire, and Cornwall; Carn Brae, Worle Camp and Chysaster, in these counties, are all towns built very much on the model of this at Greaves Ash.

After dining at the camp, the members visited Linhope Spout, a picturesque waterfall, higher up the Breamish. They then returned, following the course of the stream, to Ingram, whence they drove to Glanton and Pow Burn, where they passed the night. The members who staid at Pow Burn went to Crawley Tower, a Peel house, once belonging to a branch of the great house of Heron of Ford, and which is itself situated within a fortified place of a much earlier period. In Crawley Dene were seen rocks of the Tuedian group, a section of the carboniferous limestone, the characteristic features and fossils of which were first made out and illustrated by Mr. Tate, F.G.S., of Alnwick. The whole party then drove to Percy's Leap and Cross, and thence to Old Bewick, where Mr. Langlands, with true Northumbrian hospitality, had provided breakfast. The first place visited was the ruined chapel, one of five or six,*

* Old Bewick, Lilburne, Wooperton, Branton, Harehope and Brandon.

which, in former times, ministered to the spiritual wants of the extensive parish of Eglingham, and which are all now either in ruins or destroyed. This little chapel* is a valuable specimen of the architecture of the 12th century, with some trifling later additions and insertions. It has an apsidal termination, which still possesses its groining of rubble work. From the chapel the members proceeded to the camp or camps on the hill behind Old Bewick. This is one of the most perfect and largest of the forts in the neighbourhood. It is double, of the shape of two horse shoes, abutting on the steep scarp of the hill to the south. Four rampiers have originally surrounded it, two of which are still very perfect, and are both high and wide, at one part the bottom between them is upwards of twenty feet in depth. The exterior mound has never been so high as the others, and is now in part effaced. The rampiers are formed of large stones, which have been also covered with earth, and this is the most usual fabric of such works. The steep scarp to the south, on which these four rampiers abut, has been further protected by a low wall. Within the camp are the traces of circular foundations, similar to those at Greaves Ash.

But the most remarkable feature in connection with the Bewick camp, is the mysterious circular markings, which are found inscribed on stones, to the east of, and outside the enclosure. They exist on four stones, on one to the number of twenty-five. The principal characteristic of these markings is a series of concentric circles, engraved on the stone, more or less in number, surrounding a circular hole, from which proceeds a hollow line or duct. In other cases, four or five circular holes are found, sometimes surrounded by a circular groove, and sometimes without one. These markings have been found widely distributed under different circumstances; in some cases, as at Bewick, on stones or rocks exposed to the air and visible, in other cases on the under side of the covering stones of places of burial. One of the most remarkable assemblages of them is on a rock at Rowtin Lynn, in the parish of Ford, which, like the stones

* It is dedicated to the Holy Trinity. A short account is given of it, in a letter from P. C. Hardwich, Esq., to J. C. Langlands, Esq., and is published in the Berwickshire Field Club Transactions, vol. iv., p. 52.

at Old Bewick, is situated to the east of a camp. They have been found in Northumberland, Cumberland, Yorkshire, Scotland,* Orkney, and Ireland. Near Doddington, in close proximity to a fort, they are found on two or three rocks. They occur on Coldmartin Moor, on Chatton Law, and Cartington Cove in all these cases on exposed stones or rocks. As covers to places of sepulture, they have been found near Ford, there covering burnt bones placed in a hollow without any urn, and at Black Heddon in this county, at Coilsfield in Ayrshire, near Edinburgh, on Cloughton Moor, near Scarborough, and on Bernalby Moor, in Cleveland, placed over urns in which were the remains of burnt bodies. All explanation of their meaning is, at present, hidden, and though various conjectures have been hazarded, none of them appear to bear the impress of even probability. It cannot, I think, be questioned that their import is religious; their connection with burial, always a most sacred rite, and closely joined to the religion of all races, points most distinctly to a sacred purpose, but what the mystery is which they dimly shadow, may remain for ever unknown, at present it is completely hidden from all enquiry. They differ from all other symbolical expressions, with which we are acquainted, and seem peculiar to the Celtic tribes which once peopled all Western Europe: further enquiry may make known other instances of their occurrence, and it is not impossible that on being found, as it may happen, in connection with other and known symbols, some light may hereafter be thrown on their meaning. We may expect to find them in France, and more especially in Brittany, that stronghold of the Celtic race; in Spain, also, we may look for their occurrence, and it may be that in the distant eastern cradle of the Aryan family, we may hope for an elucidation of these sacred signs of a race which was one of the earliest offsets from Central Asia. There can be no question that to the same people who built the forts, so many of which were visited by our members on the 18th and 19th of August, and who interred their dead in cists of stone or in rude

* They have lately been found entirely covering a rock, in Argyleshire, and at Lochgilphead numbers are found, whenever the turf, which covers the hill side, is removed.

half-baked urns, sometimes practising inhumation and sometimes cremation, these markings are to be attributed. And that race is the Celtic, which peopled England prior to and at the time of the invasion of Cæsar. All historic evidence, as well as the remains now existing, goes to shew this, and although it has been assumed that there was an earlier and so-called Allophyllian race in our country, before the Celtic occupation, to which some of our sepulchral relics are to be attributed, no grounds, I think, exist, so far as our knowledge at present extends, for this assumption. When I say this, I only refer to a race, supposed to have been supplanted by the Celts, whose sepulchral remains have been found, and to which have been attributed certain skulls of a so-called Kumbe-kephalic type, but I do not question that an earlier race than the Celtic once existed, in ages long antecedent to historic times, whose remains are found associated with the extinct animals, and who occupied land, which widely differed, in geographical position and connection, from our present continent.

After leaving the great fort at Bewick, the members visited a small and very perfect one, about half a mile distant, overhanging the Harehope Burn, above the Corbie Crags. These crags, where the Harehope Burn wears its way towards the Aln, are very fine, and characteristic of our wilder Northumbrian streams. They were, until these days of unsportsman-like over-preservation of game, the abode of the raven and the peregrine falcon, but now, thanks to the stupidity of gamekeepers and the ignorance of their employers, these interesting and rare denizens of our country have been extirpated. I am sorry to say that gamekeepers are not alone the destroyers of birds; the rage for collecting, which has embraced among other subjects birds' eggs, is leading to the disappearance of many of the rarer birds from our country. Even the scientific collector cannot be held excused, and his example has led numerous followers, who have no purpose to serve but the mere lust of possession. Great destruction is also caused by school boys, and if the parish and other schoolmasters could be interested in the matter, their teaching might be most beneficially exercised to save the nests

from the depredations of their pupils. I think our Club might usefully interest itself in behalf of our feathered friends and their eggs, and though no sparrow club exists, I believe, in our district, most mischievous war against many of our useful and and pleasant songsters is carried on, which it would be most advisable to have, if possible, stopped. Some fine large masses of freestone, among others the "gray mare and foal," were seen near the Corbie Crags, and some heaps of scoria, the remains of ancient iron smelting, were observed on the east side of Harehope Burn. The members then passed through the village of Eglingham, and drove to Beanley, where another camp, one of many close by, was visited.

I have throughout taken for granted that these camps or fortified places, are the work of the ancient British tribes; they are certainly neither Roman nor Anglo-Saxon, and must therefore be attributed to the people, whom the Romans found occupying the country, when they added it to the already too wide-spread empire of Rome. They exist in very great numbers throughout Northumberland, and are more especially numerous on the lower range of hills which flank the Cheviots. Almost every hill end has been fortified, and no place of vantage, along the sides of the valleys, is without its fort. Were these erected against a common enemy, or were they the defences of one tribe against another? They bear unmistakeable evidence of the latter supposition. There is no uniform plan apparent by which they could be combined into a chain of fortresses against an invader. They do not form any true position of defence against any, except a comparatively weak and neighbouring enemy, and in fact are far too numerous and small to be more than places of refuge for one tribe against the attack of an adjoining tribe. At that time, and in such a state of society as then existed, as is the case among uncivilised nations at the present day, though for some common purposes the whole nation might, at times, combine against a common enemy, yet in general, every man's hand was against his brother, one tribe being continually in array against another tribe. A system of constant and petty war was going on, arising out of encroachments on hunting grounds, or similar causes, which rendered it necessary for the tribe to dwell, if in security, within its own

house of defence, and from this cause originated the numberless camps which crown every height.

On arriving at Alnwick, the members visited the valuable geological collections of Mr. Tate, peculiarly rich in organic remains, from the carboniferous limestone and Tuedian group. At this meeting one member was elected.

The FIFTH MEETING was held on September 17, at Ferryhill, Morden Carrs and Hardwick. The members assembled at Ferryhill, and inspected the section made, in the magnesian limestone and the accompanying fish bed, by the cutting on the North Eastern Railway, near that place. The peculiar features of this were illustrated by Messrs. Howse and Abbes, and an ineffectual search was made for remains of the fish, which have been found so abundantly in the shale, here interposed between the beds of magnesian limestone. A single specimen of *Paleoniscus* was obtained by a member from one of the railway porters. In the marshy ground near the railway station *Primula farinosa* and *Hydrocotyle vulgaris* abounded, and the slope of the wood close by was covered with a profuse growth of Columbine, *Aquilegia vulgaris*, probably not indigenous. The club then proceeded to Mainsforth the seat of Mrs. Surtees, the widow of the learned and accomplished author of the "History of Durham," and friend of Sir Walter Scott. Here they were most hospitably entertained, at breakfast, by that lady, and were afterwards shown the valuable collection of fossil fish, obtained from the cutting at Ferryhill, which was made for the old south road. These fish are of the same species, and from the same stratum, as those found in the railway cutting, near the Ferryhill Station. The same bed occurs, thrown up out of position by a dyke, near Cullercoats, and in a limestone quarry at Middridge, from the latter of which places considerable numbers of fish are from time to time obtained. At Mainsforth was seen a single horn of the great Irish Elk, *Megaceros Hibernicus*, one of a pair found in digging a pond on the Nabshill, near the house. From Mainsforth the members proceeded to Morden Carrs, where, under the able guidance of Mr. Norman, some rare plants and mollusks were obtained in the stells. Among other plants may be

mentioned, *Œnanthe phellandrium* and *fistulosa*, *Ranunculus lingua* and *trichophyllus*, *Hottonia palustris*, *Hydrocharis morsus-ranæ*, *Callitriche platycarpa* and *pedunculata*, and among numerous mollusks, *Zonites nitidus*, *Limneus palustris* and *stagnalis*, *Planorbis marginatus*, *carinatus*, *contortus* and *spirorbis*, *Bithynia tentaculata* and *Physa fontinalis*. In some marshy ground surrounding a spring just below Morden, the little *Limosella aquatica* was flowering in great abundance, accompanied by *Bidens tripartita*, which was also gathered near Bradbury. From Morden Carrs the club passed to Sedgefield, where the church was visited. It is a very fine example of a parish church, containing in the quadrupled and banded columns of the nave, with their fine capitals, carved in foliage, an exquisite specimen of early 13th century work. The rest of the church is of a later date, the greater part about 1379, when the north transept was built as a chantry chapel. The ceiling of the chancel, its panelling and seats, and the very handsome canopied screen, present many features in common with the screen and chancel fittings at Brancepeth, and may certainly be attributed to the same architect. They are of a date sometime before the year 1600, and are of a very superior character to most works of Gothic feeling of that period. Mr. Norman read a paper upon its architectural features and history, and pointed out all the objects in it, worthy of note. Hardwick Hall was the last place visited, and here the courteous liberality of Christopher Bramwell, Esq., was evidenced by his entertaining the members at dinner. Hardwick, now the property of Lord Boyne, is a good specimen of the formal taste of the beginning of last century, with ornamental pieces of water, temples, &c.—it has never been finished. In the Serpentine were noticed, among other water plants, *Myriophyllum spicatum*, *Utricularia vulgaris*, *Potamogeton flabellatus*, Bab., or perhaps it may be *P. pectinatus*, Lin. After dinner Mr. Norman read an account of the successful dredging operations on the Northumberland coast, conducted under the authority of our Club, aided by a grant from the British Association for the Advancement of Science. A full report of these operations is now in the hands of our members.

An invitation was given to the British Association to visit

Newcastle this year, and Messrs. Mennell and Tristram were deputed to convey this invitation to the Association at the meeting in 1862, at Cambridge. This year Newcastle is to be honoured by the presence of that distinguished body, and I am sure that it will be the study of all our members to do what lies in their power, to further the interests and objects of the Association, during its visit to Newcastle. Seven new members were elected at the Ferryhill meeting.

The Sixth and Last Field Meeting was held on October 24th at Marsden. The members assembled at the North Pier, Sunderland, and walked along the coast by Roker and Spotty's Hole. Near this place some curious nodular beds of limestone were examined and explained by the Rev. G. C. Abbes. Thence to Whitburn, where the remains of a submerged forest are visible at low water, but from the state of the tide, the members were unable on this occasion to see it. From Whitburn the coast as far as Marsden was explored, with its very interesting geological features. Tea was drunk at Peter Allan's at Marsden Rock, and afterwards the Rev. G. C. Abbes delivered an able and lengthy address on the geology of the district, in which he made special mention of a titaniferous sand, which he had observed along the coast, and which somewhat resembles the rich steel sands of New Zealand.

At this meeting five new members were elected.

I have given a hasty, and I fear it may be, at the same time, a tedious account of our several field meetings last year; for when the various incidents and objects noticed on our out-of-door expeditions have to be related, and when the sunshine and shade of the scene itself are wanting, it is rare not to become tedious and dull. I have endeavoured, however, to intersperse the dry relation, with a few stray notes, here and there, which may in some imperfect way have added an interest, if not a liveliness, to the narrative. To those who were present at our several meetings, it may serve to recal some of the pleasures of the most delightful days we spent, but I cannot hope that it will give, to those who had the ill luck to be absent, anything, which can even imperfectly shadow forth what we saw and enjoyed.

Three Evening Meetings were held during the year, at the second of these, on February 19th, the following papers were read :—

1. On *Proteus anguinus*, by Mr. W. Henderson.

2. On a Chimpanzee, which died in a Menagerie, at Newcastle, by Dr. Embleton.

3. An account of the opening of a tumulus, at Grundstone Law, with a description of the contents by the Rev. W. Greenwell and Dr. Embleton. This paper will be printed in the Transactions.

The Rev. G. C. Abbes gave a short account of the trawling operations now going on on this coast, to the great injury of the fisheries. It was resolved to petition Parliament in favour of Mr. Fenwick's motion for a Royal Commission to enquire into the subject, and the Secretaries were requested to draw up a petition accordingly. This has been done—and the petition was sent to Mr. Somerset Beaumont for presentation.*

Before I conclude my address, there are one or two matters on which I wish to say a few words. The first, and which is I believe, a very important matter, as regards the Club, is the restrictive law passed last year, as regards the admission of new members. I cannot but regret that this measure was ever passed,

* *To the Honourable the Commons of the United Kingdom of Great Britain and Ireland in Parliament assembled,*

The humble Petition of the Tyneside Naturalists' Field Club,

Sheweth—That for some time past there has been on the coasts of Northumberland, Durham, and Yorkshire, a large number of Fishing Smacks, whose mode of fishing is new to the coast, injurious to the interests of a large body of industrious men, and utterly destructive of the future supply of a most important article of food.

That the immense nets used by these vessels are calculated to sweep from the sea bed every thing that comes in their way; thus not only bringing up multitudes of small immature fish, but also dragging to the surface, in prodigious quantity, the spawn, which, when once detached from the place where it was deposited, is exposed to certain destruction.

That one of the chief objects of your Petitioners Club, is the preservation of animal and vegetable life, in their district, from wanton destruction; they therefore pray your honourable House to institute an enquiry into the results of the system of Trawl-fishing, with a view to the prevention of the evils which threaten the ruin of the fisheries on this coast.

And your Petitioners will ever pray.

Signed, on behalf of the Tyneside Naturalists' Field Club,

W. Greenwell, President.

George S. Brady, Thomas Pigg, M.D. } Secretaries.

and which I believe was done in a great measure through misapprehension, because I think it very materially interferes with our usefulness. One great purpose of a society like ours is to bring as many persons as possible within the range of our efforts, and of the objects we pursue, so as to beget in as many minds as we can influence, a taste for those sciences, for the promotion of which, among other things, our Club was established. Now to limit our numbers is surely to limit our efforts in the prosecution of the objects we have in view, and to cut us off from the opportunity of drawing many others into that circle, within which we hope we have ourselves been of some use. I have no doubt that from the large and increasing numbers of our body, some difficulty in management has occurred, but I think this is an evil not without a remedy, and at all events, we should not stop short, until the working has been found not only difficult but impossible, an event which I do not anticipate as ever being likely to occur. With our increased numbers our funds have necessarily proportionately increased, and a certain sum might be set aside to pay some subordinate official, who might, under the guidance of our honorary secretaries, relieve them of the burden of a large correspondence, and other routine work. It is not generally desirable, of course, to alter a fundamental rule hastily, and so shortly after it has been brought into operation, but in this case I hope that the change may be made as speedily as possible, for I would not willingly see a single person kept back from joining our ranks.

A second matter to which I think the attention of the committee should be drawn, is the necessity of varying, as much as may be, our places of meeting. We have too much fallen into a regular groove as to the places we visit, and perhaps it was not easily avoided a year or two ago, but we have now got more than one new line of railway into operation, opening out interesting and fresh fields of investigation, and we should avail ourselves at once of these additional routes. North Tyne and the borders of Scotland, full of subjects of enquiry and objects of beauty, are now brought within an easy distance by the Border Counties' Railway, and we have also gained access to the district which lies to

the west of Morpeth, hitherto not easy of approach. And even upon the lines of the older railways there are many places which we have never, or rarely, visited, and which would amply repay us for their selection. A sea voyage might be taken, being careful to select a time of year when the sea is likely to be calm; and few places more suitable than the Ferne Islands, during the breeding season of the numerous birds that frequent them, could be found in England; the Yorkshire coast north of Whitby might, in the same way, be reached by sailing from Sunderland, and in spite of the miseries which, to most, attend a trip on salt water, I believe these expeditions would be as popular as they certainly would be instructive.

The remaining suggestion which I have to offer, is one which will engage the labour of all our members, but which I am sure is quite worthy of it: it is to make our Club the means of collecting and recording the names of fields, houses, farms, and such like places, which occur within our district. The names of villages and larger places are found in our maps, but no record has ever been made of these equally valuable localities, which have hitherto only possessed an interest to the local population among which they occur. I do not mean, of course, that ordinary and common place names are to be recorded, such as *middle field*, *ox close*, or *cow pasture*, but only those which convey some, so to speak, historic meaning, either as regards events or language. The instances of such names are innumerable, and very valuable records of past times and of past thought may be preserved by such a collection as I propose. Every member in his own locality, and all of us in our visits to country places, may gather together what we can pick up, and the club can print a list, with illustrative notes, in its Transactions from time to time. Such a collection should have been made some time ago, for in consequence of freer intercourse and easier modes of transport, old populations are disappearing or changing their places of abode, and so names which had many a tale to tell, or event to hint at, have died away and been lost. The value of such a collection would be great indeed, whether we regard the light which might in this way be thrown on local or even general history, or whether

we look at it as philologists, or enquirers into ancient superstitions, which are in fact religions. In such names records of facts, forgotten or overlooked by history, linger for centuries, traces of languages, now unknown or unspoken, remain to testify, to the present race, of the occupation of the land by another and earlier one, and the field which a fairy tenanted, or the lane down which a brownie was wont to pass, may serve to give us a clue to a form of faith, which influenced the heart, and regulated, as a governing principle, the community, ages before the Christian faith was promulgated, or even before our ancestors had left their far off eastern home.

It only remains for me to congratulate our Club on its flourishing condition, to wish it success in its valuable and pleasurable labours, and to thank most sincerely its members for the enviable honour they paid me, when they elected me the President of the Tyneside Naturalists' Field Club.

Catalogues of various branches of our local Natural History are in preparation by different members of our Society ; among which the following may be mentioned. Some of them, it is hoped, will be ready for the printer at a very early date.

Mammalia, by H. F. Mennell and V. R. Perkins,
Hymenoptera, by T. J. Bold.
Carboniferous Fossils, by R. Howse.
Foramenifera, by H. B. Brady.
Crustacea, by Rev. A. M. Norman.
Fresh Water Algea, by G. S. Brady.

Members Elected since the last Anniversary.

The following gentlemen have been elected members of the Club during the past year:—

At the Anniversary Meeting:—Henry George, John Wilson, and J. Stanger, of Newcastle; Mariner Redmayne, Tynemouth; Edgar J. Meynell, W. R. Fitzgerald, R. N. Robson, and the Rev. E. Greatorex, M.A., Durham; the Rev. G. R. Bigge, M.A., Ovingham; and the Rev. J. C. Geikie, Sunderland.

At the First Field Meeting:—Edward Green, George Crawhall, Rev. T. Crossman, and E. R. Robson, Durham; Rev. J. H. Blunt, Newbottle; Capt. J. W. H. Robinson, Lewis C. Legge, and the Rev. A. J. B. Blagdon, Houghton-le-Spring; M. T. Culley, Copeland Castle, Wooler; Gibson Kyle and G. E. Swithinbank, Newcastle; the Rev. J. H. Evans, and William Richardson, (Boughton St.,) Sunderland; the Rev. J. S. Nichol and the Rev. Thos. Hodgson, Hetton.

At the Second Field Meeting:—Dr. Jullion, Forres Villa, Gateshead; J. Ogilvie, North Shields; J. H. M'Chesney, Stephen Scott, and John Hall, Newcastle; W. Turnbull, West Hartlepool.

At the Third Field Meeting:—T. W. Brown, Sunderland; Edw. Culley, Newcastle; H. Proctor, Tynemouth.

At the Fourth Field Meeting:—G. H. Philipson, M.B., Newcastle.

At the Fifth Field Meeting:—C. Bramwell, Esq., Hardwicke Hall; Alex. Lawson, B.A., Seaton Carew; H. J. Fox, Trinity College, Cambridge; W. C. Stobart, Etherley; George Wright, Hetton; Thos. Spence, North Shields; Rev. Robt. Stevenson, Ryton.

At the Sixth Field Meeting:—Jas. Stokoe, J. W. Fletcher, J. C. Tone, and the Rev. G. C. Maitland, Sunderland; John Swallow, and John Swallow, jun., West Harton Colliery; Wm. Latham, Birtley; J. Finlay, and J. M. Moore, South Shields.

At the Second Evening Meeting:—J. A. Cowen, Blaydon Burn; F. L. Guildford, R. R. Redmayne, G. C. Gilchrist, Samuel Rixley, and T. C. Nesham, Newcastle; W. Henderson, Durham; F. M. Webb, Claughton, Birkenhead; Ralph Robson, Hexham.

The days and places for the Field Meetings were fixed as under:—

Tuesday, May 19 .....Ryhope.

Friday, June 12 .....Lanchester.

Wednesday, July 15...Kieldar.

Friday, August 21....Boulmer, Alnmouth and Amble.

Wednesday, Sept. 16.Rosehill.

Thursday, Oct. 8 .... Rokeby, and Barnard Castle.

The following gentlemen were appointed office-bearers for the year 1863–4:—

PRESIDENT.

Edward Charlton, M.D.

VICE-PRESIDENTS.

Richard Howse,
Rev. A. M. Norman, M.A.
Rev. G. C. Abbes, M.A.
D. Embleton, M.D.
Rev. W. Greenwell, M.A.
Rev. J. F. Bigge, M.A.

TREASURER.

Robert Y. Green.

SECRETARIES.

George S. Brady.
Thomas Pigg, M.D.

LOCAL SECRETARIES.

John Booth (*Durham.*)
Rev. W. T. Shields (*Hexham.*)
W. H. Brown (*North Shields.*)

COMMITTEE.

Joshua Alder.
Joseph Blacklock.
Robt. B. Bowman.
H. B. Brady, F.L.S.
E. J. J. Browell.
J. Daglish.
A. S. Donkin, M.D.
Albany Hancock, F.L.S.
John Hancock.
John Thompson.
Thos. Thompson.
Robt. Vint.

AUDITORS.

Henry Turner.
J. S. Foster.

THE TREASURER IN ACCOUNT WITH THE TYNESIDE NATURALISTS' FIELD CLUB.

Dr.				Cr.			
1862.				1862.			
To Balance	£8	19	11	By Messrs. M. & M. W. Lambert, Printing Reports	£59	1	5
Subscriptions, Entrance, &c.	111	12	6	,, Mr. Forrest, Commission, &c.	6	10	4
				,, Share of Dredging	11	2	1
				,, Sundries	2	12	6
				1863.			
				Balance	41	6	1
	£120	12	5		£120	12	5

Examined and found correct,

HENRY TURNER,
J. S. FORSTER, } Auditors.

I.—*Notes on a Tumulus and its contents, at Grundstone Law, Northumberland.* By the Rev. Wm. Greenwell, M.A., and D. Embleton, M.D.

Any discovery, however trifling, which throws light upon the ancient tribes, who occupied our country before historic times, is of deep interest; and among such data none are more valuable than those which elucidate the sepulchral, and therefore religious, customs of those people. To record such discoveries comes quite within the range of our Society, more especially as these remains are daily, under the progress of cultivation, being destroyed, in most cases without any notice of the circumstances connected with them being recorded. The object of this paper is to give an account of the opening of a sepulchral tumulus, at a place called Grundstone Law, in the parish of St. John Lee, in the county of Northumberland, which was examined June 14, 1862.

Grundstone Law, which probably takes its name from some large stone or stones, fixed in the earth and rising above the surface, is situated about three miles north of the Roman Wall, and one mile and a half east of Watling Street. On the top of a hill, which slopes rapidly to the north and east, occurs one of those fortified places which are so common in this district, and which were probably the strongholds of the British tribes. This camp is surrounded by a mound and ditch, and is circular in form. On the south side of it, within a few yards distance from the mound, is situated the tumulus, of which this paper gives an account. It is circular, about forty feet in diameter and four feet in height. It has been originally surrounded, at the base, by a circle of large whin boulders, so many of which are scattered over the neighbouring district. These stones are now, with the exception of two of them, removed from their first position, and are lying, some at a little distance from the tumulus down the slope of the hill, whilst others have been used to form the wall of the field in which the camp occurs. It may here be noticed that the tumulus had been opened some years ago by Mr. Coulson, the intelligent tenant of the farm, in support of a theory,

connected with the battle between King Oswald and Cædwalla, which it is not necessary here to enter into. He found, a little below the surface, and lying on a slab of stone, which was placed above the covering stones of the cist, the remains of a skeleton, which have not been preserved. He also broke into the cist, but did not disturb the contents.

The tumulus is formed of stones and earth, and on opening it, when the level of the original surface of the ground was reached, an oblong cist was discovered, hollowed out of the limestone rock, and in part lined with sandstone slabs. The cist, which lay east and west, was six feet in length, two feet nine inches in width, and two feet three inches in height. On the north side was one lining stone of sandstone, which did not occupy the whole of the side; on the west side was also one stone, similarly placed; on the south were four stones, whilst the east end was formed of the limestone rock alone. It was covered with four large sandstone slabs, about eight feet in length and eight inches in thickness. Within this cist were found the remains of two bodies, of which a full description is given in this paper. The more complete one was lying on its left side, with the legs doubled up, the head being at the east end of the cist. The bones of the second body, which were few in number, were lying irregularly in the cist; one of them, the *radius*, a bone of the fore arm, was standing against the south side of the cist. The question here suggests itself, were not these bones of the second body the remains of the skeleton found by Mr. Coulson above the cist? Mr. Coulson is quite certain he placed none of them in the cist; but it is possible that, whilst taking some away, he may have put some into the cist and forgotten that he had done so; the bone standing upright against the side of the tomb seems to point to an introduction of that bone posteriorly to the decay of the body to which it belonged. On the whole it appears most probable that these fragmentary bones are part of the skeleton which was interred above the cist. On the other hand, all the bones were imbedded in a loamy matter, which had no doubt been carried into the cist by the percolation of water through the joints of the cover, and therefore it may be argued that the

two bodies must have been buried at the same time, or at all events, that the bones of one could not have been placed in the cist only a few years ago, for then they would have been found lying on the surface of the loam. But here another question arises, when was this loam formed? It may not have existed previous to the first opening by Mr. Coulson, who, to obtain admission, broke one of the covers, and left the tumulus with a hollow in the centre instead of its original pyramidal top, and in consequence of this, water, charged with earth, may have found admission into the previously water-tight tomb. I fear this question cannot be quite settled, which is unfortunate, as the undoubted occurrence of two bodies in one cist is an unusual and, therefore, interesting circumstance. No remains of weapon, implement, or urn were discovered, although the loam was all most carefully examined. It may therefore be concluded that the chief whose burial place this was, had been interred without any of the usual accompaniments of a British burial.

The bones are of a dark brown colour, and much decayed, soft, friable, as if eroded, and freshly exposed white surfaces of parts of the legs and skull adhere as forcibly to the tongue, brought into contact with them, as the unglazed clay of a tobacco pipe, showing the absence of a large portion of the gelatinous base of the bone. The shafts of the bones show their medullary cavities open here and there, the ends are perforated, like some museum specimens illustrative of caries, and the articular surfaces, especially those of the knees, are very imperfect. The bones have been those of two skeletons, both equally decomposed, as if they had been interred together, and subjected to similar influences. One skeleton is taller than the other, but not so robustly formed. Both are distinctly larger in dimensions than an artificially articulated skeleton, which measures five feet seven inches.

1. Of the taller skeleton, which may have been also the younger, only a few bones are before us; these are an atlas, a scapula, a humerus, a radius, a tibia, and a fibula, all more or less broken, and two or three tarsal bones. They shew no traces of epiphyses, and are therefore those of a mature adult. They are large and strong, indicating the male sex; the age may per-

haps be taken at thirty years or over, and the height at about six feet.

2. Of the other skeleton we possess the occipital half of the cranium and the lower half of the face, and fortunately these two fragments fit each other at a small point on the base, so that with a little trouble they can be placed in their proper relative positions. The cranial fragment comprises the whole of the occipital bone, with portions of the sphenoid, temporals, and parietals. The facial fragment embraces the superior maxillæ, with scraps of the palate and sphenoid bones, and the entire lower jaw. The spinal column is represented by the three upper cervical, by portions of three or four dorsal, of two or three lumbar vertebræ, and by that part of the sacrum formed by its coalesced arches and spinous processes, to the lower end of which part of the coccygeal bone is anchylosed. The first rib of the right side, and broken pieces of fifteen others, are all that remain of the chest. Of the upper extremities there exist the right scapula, imperfect, both clavicles nearly entire, the long bones, all a good deal broken, four metacarpals and one finger bone. Of the lower extremities we have part of the pelvis, the long bones much damaged, the left patella, the ossa calcis and astragalus, five or six metatarsals, and two toe bones. These are all large, strongly made, with ridges and hollows well marked, show no trace of epiphyses, and appear to have belonged to a man about five feet ten inches in height.

The following details respecting the bones of this skeleton and the inferences drawn therefrom, may not be devoid of interest.

The skull, which appears to have been brachy-cephalic, was posteriorly of large size, well rounded and smooth, the cerebral portion being capacious and the cerebellar fossæ small. The frontal outline altogether wanting; the right side of the cranium very deficient; the parietal contour very imperfect; the sagittal suture almost obliterated. When the two fragments of the skull are fitted together as correctly as possible, a book fully an inch thick being placed under the occiput, the highest part of the cranium lies directly over the auditory foramina. The point that projects farthest backwards is one inch and a quarter above

the external occipital protuberance. The broadest part is between the bases of the mastoid processes, and measures five inches and three-quarters. The perpendicular height inside from the anterior margin of the foramen magnum, is five and a half inches. Circumference of arch (inter-auditory vertical) fourteen inches; circumference of arch (inter-auditory horizontal) nine and a half inches; length from front of superior maxilla, just above incisor teeth, to anterior margin of foramen magnum, fourteen and a quarter inches; transverse diameter of foramen magnum, one inch and a quarter; antero-posterior diameter of foramen magnum, one inch and a half; from posterior margin of foramen magnum, over the external occipital protuberance to highest point at vertex, seven and three-quarter inches. The angle of the jaw is obtuse, notwithstanding that the teeth are nearly perfect; three wisdom teeth and the last great molar of the right side of the upper jaw only are wanting, and the sockets of some of these show that they had probably been present at the time of death. The teeth are somewhat worn, and largely encrusted with tartar. The incisors of the upper much overlap those of the lower jaw; this condition, which is met with now and then at the present day, must have given a peculiarity of expression to the face. The fragment of sacrum is five and a half inches long, therefore most probably male, the coccygeal anchylosis indicating an age of about forty years.

The extremities. Upper.—The clavicles are strong and well curved, the right bone has its sternal end more largely developed than the left, indicating a right handed man. The right clavicle is six and a half inches in length; humerus, fourteen and five sixteenths of an inch; radius, ten and a half inches; ulna, eleven and three-quarter inches.

Lower.—The pelvic fragment is that of a male. The femur is nineteen and a quarter inches in total length; the tibia, sixteen and a half inches. Nearly all the articular surfaces of the bones, particularly of those of the left side, have suffered a change, whereby the motions of the joints must have been for some time before death impeded to a considerable extent; within and around some joints small exostoses have been

formed, and the spaces for muscular attachment have been rendered somewhat indistinct. On the articular surfaces there are seen raised borders, that on the humerus being half an inch in breadth, which have evidently restricted the movements to the enclosed central part of the surface.

From this state of the bones it seems fair to infer that, for some time before death, either from some grievous bodily hurt, or sudden invasion of disease, the movements of the person must have been restricted to a considerable extent and executed painfully, so that instead of dying as a great warrior on the well-fought field, it is more probable that he died lingeringly in his bed, and was buried quietly amongst his own people. Though the length and the strength of the bones, and the noble size of the occipital portion of the skull, shew that in earlier life he had enjoyed his full share of health and intellect, the size of both skeletons discountenances the idea that they belonged to the primæval race of Britons, which was one, as Professor Huxley says, of "small, slightly-made men," and would lead us to suppose that they belonged rather to some Romano-British people, or Britons of the Saxon period, many of whom are known to have been tall and powerfully made. That these were men of eminence we may conclude from their mode of burial.

It is much to be regretted that this place of sepulture should have been so much disturbed previously to the present investigation, that the skull of one skeleton with the greater part of the bones should be missing, and that the capacious cranial fragment which has been described should be deficient in its noblest and most interesting part.

II.—*Remarks on some of the Algæ in Mr. Winch's Herbarium.*

By George S. Brady.

In the Catalogue of the Marine Algæ of Northumberland and Durham, published in the fourth volume of our *Transactions*, I had to quote several plants as natives of our district on the authority of Winch's Flora, which refers in several instances to specimens preserved in his herbarium. I was therefore anxious, for the sake of verifying these references which seemed to me in many cases more than doubtful, to have an opportunity of examining the original specimens now in the possession of the Linnæan Society. I am indebted to the President and Council of that Society for permission to examine the collection, which, through the intervention of my valued friend Professor Oliver, was kindly sent down to me for this purpose. The result of my investigation is contained in the following notes:—

Elachista flaccida, *Catalogue p.* 279. The specimen found near Berwick, and named by Dr. Johnston, is clearly referable to the common species, *E. fucicola*. *E. flaccida* must therefore be expunged from our list.

Elachista curta, *Dillw.* A specimen so named is very distinct in appearance from any species known to me, and agrees very well with Dr. Harvey's description, but Dillwyn's plant seems to be quite unknown to recent collectors and to Dr. Harvey, except from a single specimen preserved in Sir W. J. Hooker's herbarium. Winch's specimen was found on the stem of a *Fucus* at Seaton, and is very probably rightly referred to *E. curta*.

Mesogloia vermicularis, *Cat. p.* 278. *M. virescens* is erroneously called *vermicularis* in Winch's collection. For the latter species, therefore, the Holy Island habitat is the only one at present known in our district.

Polysiphonia stricta is referable to *P. urceolata*.

Calliblepharis ciliata, *Cat. p.* 295. The two specimens of this species are rightly named, and are the only ones which I have seen from our coast.

Ceramium ciliatum, *Cat. p.* 303. The species so named is *C. acanthonotum*. *C. ciliatum* has not yet been found in this district.

Griffithsia equisetifolia, *Cat. p.* 304. A single specimen of this plant, found washed up at Hartlepool, is the sole warrant for its insertion in the Catalogue. There can be no doubt of the correctness of the reference.

Griffithsia corallina, *Cat. p.* 304, must be excluded from our list. The specimens so named by Mr. Winch are really *G. setacea*.

Callithamnion tetragonum, *Cat. p.* 306. The specimens given under this name must be referred to *C. Arbuscula*.

Cladophora gracilis, *Cat. p.* 309. A specimen of this plant from tide-pools at Seaton is called by Mr. Winch *C. lætevirens*. It is the only example of *C. gracilis* that I have seen from the Durham Coast.

Of the following species, which were included in the Catalogue on the faith of Mr. Winch's "Flora," I have found no trace in his herbarium, and I fear we must consider their claim to consideration as denizens of our district to be null and void until more fully confirmed:—*Cystoseira ericoides*, *Arthrocladia villosa*, *Haliseris polypodioides*,* *Sphacelaria scoparia*, *Polysiphonia fibrata*, *Codium tomentosum*, *Rivularia atra*, *Calothrix scopulorum*.

* The collection contains a specimen of this plant, but no locality is given. I have never found the species on our coast, though Mr. Winch says it is "not rare," and as it is one which could not well be overlooked, it is most probable that Mr. Winch confounded it with some other species. It must be remembered that when the "Flora" was published, the Algæ and all the lower forms of life were but very imperfectly understood, and the microscope was just beginning to be known as an instrument of research. We cannot but expect that a list composed under these circumstances would show many and serious inaccuracies.

III.—*Meteorological Report for* 1862. Edited by Henry T. Mennell, F.L.S.

The collection of facts and statistics bearing on the meteorology and climatology of our district was originated by my predecessor in the secretaryship of the Club—Professor Oliver. He did not, however, remain long enough in the North to edit the record of the first year's observations, and it therefore became my duty to undertake a task, which, or seven years, it has been not only a duty but a pleasure to fulfil to the best of my ability. In this however, as in all matters connected with the Club, I have owed much to the co-operation, always cordial and zealous, of my fellow members. The list of contributors appended annually to these reports has not discharged my debt of acknowledgement, for to some of them I have owed far more than the mere facts with which they have supplied me. From these fellow-workers as well as from those readers who may have forgiven the manner for the sake of the matter, I cannot now part without regret, and I take this opportunity of expressing to the members of the Club my grateful sense of the kindness with which they have always seconded my efforts in the service of the Club. Let me assure them that the prosperity of the Club depends upon the continuance of that *esprit de corps*, that excellent feeling between officers and men, which in some little experience of public bodies I have nowhere found so healthy and vigorous as amongst ourselves.

The value of the facts contained in these annual reports depends so much on the length of time over which they extend, that I trust nothing will interfere with their regular appearance for many years to come, and I would suggest the desirability of obtaining returns of the rain-fall from a greater number of stations in our district. There are no doubt many gentlemen who possess rain-gauges and record the rain-fall regularly, who have not furnished the Club with the result of their observations. Our country members might no doubt, by a little inquiry, ascertain whether such is the case, and press into the service of the Club those who have hitherto held aloof.

Since the recent removal of the instruments belonging to the Ordnance Survey Department, I know of no record of the rain-fall kept at Newcastle. Surely this hiatus should be speedily filled.

We have no station in the Tweed, none on the extreme west of either county, on the watershed of our rivers, and none near the mouth of the Tees, all localities of interest and importance from their position on our extreme frontiers, or from other causes.

The tables of the rain-fall which are appended do not call for much remark. The quantity of rain was not equal to the average; it was slightly less than that of the previous year, the average at 14 stations being 26·93 against 26·96in 1861.

In 1861, November, February, and July, were, in the order named, the wettest months of the year; in 1862, August, March and June, had that distinction. In the former year May, in the latter September, was the driest month.

In 1862, the fall in the wettest month (August 4·21 in.) did not equal that of the wettest month in 1861 (November, 4·6 in.) The fall in the driest month of 1862 was not so small as that in the driest month of 1861, hence the range of variation in the monthly quantities was less, and the rain-fall was more evenly distributed.

The climatological tables mentioned in the last report were largely distributed, but have not been so generally returned as could have been wished; it will no doubt require a year or two's experience and attention before they become as useful as they might be. Even where they have not been kept with sufficient regularity to be returned, they may have led members to observe and note down facts occurring around them, which had hitherto passed unregarded. If they thus tend, in however small a degree, to recruit the ranks of our accurate and careful observers, they will have done the Club good service.

Snow fell generally in our district in the second week in April. Thunderstorms were reported at nearly all our stations about the ninth of May; and again, accompanied with very heavy hailstorms, and much wind, in the early part of July. Mr. Graham reports

snow at Rothbury on the 21st of May, and very cold weather is then generally noticed by our observers. Mr. Graham records very heavy rains from the 5th to the 12th of June, and also on the 7th and 8th of August, when the Coquet was much flooded, carrying down with it hay and turnips.

The storm of August is also noticed by Mr. James W. Dees at Wallsend, who records the rain-fall as follows :—August 7th, 1·3 in. ; 8th, 1·63 in. ; 9th, ·705 in.; total for the three days, 3·635 in.

Mr. Dodgson refers to the mischief done to the wheat by the storms of July at Whorlton, from which, he says, it never recovered.

From the very complete and valuable observations made at Southend, Darlington, under the direction of Edward Pease, Esq., by Mr. John Richardson, I extract the following statement of the mean temperature there in 1862 :—

January	34·5	July	52·0
February	38 3	August	55·0
March	33·3	September	52·0
April	43·5	October	47·0
May	49·2	November	34·5
June	51·0	December	39·5

Mean temperature of the year, 44·15.

The prevalence of various winds at certain stations is given below.

	N.	N.E.	E.	S.E.	S.	S.W.	W.	S.W.
Seaham	19	26	46	44	26	71	99	34
Dunterley	33	23	64	38	5	6	178	18
Rothbury	3	36	58	42	2	53	101	69
Darlington	45	60	5	57	55	80	5	56
Newcastle (imperfect)		40	2	51	5	101	22	29

George C. Atkinson, Esq., of Wylam Hall, has favoured me this year, as on many previous occasions, with much valuable information, part of which will be found below, and in a supplementary table appended to this report.

He observes in regard to the rain-fall and temperature of 1862—"The greatest fall was registered on the morning of June 8th, for the previous twenty-four hours, and amounted to 1·72 in.

The season after May was remarkably cold and ungenial; in fact the low temperature of the summer months was the most important fact of the year. The mean monthly temperature ($=\frac{\text{Max.} + \text{Min.}}{2}$) was as follows:—

	1862.	Average of 6 previous years.
January	38·39	36·82
February	40·80	38·09
March	39·54	41·40
April	45·67	44·40
May	53·11	51·38
June	54·85	57·70
July	56·40	58·95
August	58·08	59·90
September	53·57	54·11
October	49·03	47·99
November	36·76	40·86
December	42·80	37·90
Mean	42·44	47·55

From this it will be seen that though the mean temperature of the year was very nearly the same as the average for the previous six years, that of the growing and ripening months of June, July, August, and September, was much below it.

It will also be seen that the fall of rain for the last six months of the year was below the average, and that the whole rain-fall of the year was (31·07—24·68) 6·39 inches below it.

The number of days on which rain fell was in each month of the year larger than usual.

As a tabular statement of the number of days on which rain or snow fell, during the last fourteen years may have some interest, I enclose it, as I think it may be considered a fair indication of wet and dry days in the valley of the Tyne. The observations previous to November, 1853, being, however, taken at West Denton, 272·7 feet above the level of the sea; and afterwards at Wylam Hall, 96 feet above it."

*Table showing the Number of Days on which Rain or Snow Fell, for Fourteen Years, at West Denton and at Wylam.**
By George C. Atkinson, Esq.

Month.	1849.	1850.	1851.	1852.	1853.	1854.	1855.	1856.	1857.	1858.	1859.	1860.	1861.	1862.	Total.	Average days on which rain fell.
January.....	19	12	11	10	15	14	10	14	13	4	12	20	15	16	185	13·2
February	7	14	14	11	21	5	16	11	7	5	15	16	14	16	172	12·3
March.....	16	13	15	5	14	5	13	4	15	7	7	20	19	24	177	12·6
April	27	17	17	6	11	5	5	13	12	7	19	14	13	16	182	13·0
May.....	16	22	12	11	14	18	10	16	12	13	3	14	10	18	189	13·5
June.....	12	..	11	18	10	10	15	15	7	8	10	18	17	19	170	13·1
July.....	23	..	15	9	18	17	12	9	10	11	11	14	25	20	194	14·9
August.....	19	15	11	11	8	20	15	13	8	17	13	21	14	15	200	14·3
September....	14	9	4	12	9	8	4	16	13	14	17	15	19	14	168	12·0
October	13	18	8	16	18	9	13	11	13	17	12	19	13	18	198	14·1
November	15	12	9	18	..	21	15	11	15	10	17	23	25	16	207	15·9
Deeember.....	18	7	6	16	..	17	11	13	8	14	17	25	16	19	187	14·4
Total.....	199	..	133	143	..	149	139	146	133	127	153	219	200	211	2,229	163·3
Per Cent.....	54·5	..	36·4	39·2	..	40·8	38·1	40·0	36·5	34·8	41·9	60·0	54·8	57·8	..	44·7

*West Denton is 275 feet above mean high water at Liverpool. Wylam is 96 feet above mean high water at Liverpool.

Monthly Register of the Rain-fall in inches, with the number of days on which Rain fell, and of the prevailing Winds for 1862.

	TEES.				COQUET, CHEVIOT, &c.						TYNE.																		WEAR.							
Place.	Darlington.		Whorlton.	Howick.	Belford.		Rothbury.		Roddam	Glanton Pike.	Lilburn.	Allenheads		Dunterley, near Bellingham.		Stamfordham.	Bywell.		Wylam.		Cramlington.†	Newcastle.			Wallsend.	North Shields.		Seaham.		Sunderland ‡		Durham.		Mean fall of Rain at 14 Stations.	
Elevation above sea-level in ft.	135		450	120	209		280		510	534	312	1360		401		380	87		96		263	187			..	80		....		130		341			
	Quant.	Wind.	Quant.	Quant.	W.	Wind.	W.	Wind.	Quant	Quant.	Quant	W.	Quant.	W.	Wind.	Quant.	W.	Quant.	Quant.	W	W.	Quant.	W.	Wind.	Quant.	Quant.	W.	W.	Wind.	Quant.	Quant.	W.	Quant.	W.	1862.	1861.
January ..	2·01	SW,S,NW	2·00	1·56	14	SW, NW	17	W	2·81	..	1·682	27	4·173	17	SE, W	2·43	22	2·79	2·10	16	17	..	18	SW, NW	2·254	2·499	23	18	W, S	1·96	1·965	19	1·79	17	2·213	1·63
February ..	0·79	NE, SE	0·92	1·64	22	SE, SW	21	SW, E	1·94	0·48	1·199	24	1·751	17	E, N	1·20	16	1·52	1·48	16	17	..	19	SE, NE	1·660	1·328	22	17	W, E, SE	1·21	1·485	19	1·18	16	1·335	3·39
March	3·47	NE, SE, E	4·11	2·23	..	....	30	E, W	5·15	4·16	3·882	28	4·288	21	W,NE	3·28	24	3·91	3·61	24	27	..	27	NE	3·690	3·430	29	25	E. NE	2·99	3·213	21	3·98	25	3·727	2·56
April.....	0·90	SW, NE	1·88	0 65	..	....	21	E, W	2·35	0·44	1·400	20	2·997	17	W, E	1·48	10	1·35	1·34	16	15	..	16	SW,NE	1·362	1·530	21	16	NE,W, SW	0·80	1·065	15	1·06	17	1·396	1·58
May	1 82	Var.	2 72	2·35	..	....	20	NW,W,E	2·09	2·51	2 170	21	3·816	19	W, E	2·73	19	3·18	2·60	18	16	..	14	SE, SW	2·440	3·093	22	16	SW, S	2·20	1·795	14	2 17	15	2·503	0·94
June	2·22	NW, SW	2·19	1·36	..	....	24	W, SW	3·41	3·67	3·120	26	5·273	19	W	3·91	22	2·55	3·17	19	19	..	19	SW	3·190	3·301	26	18	NW, SW	2·54	3·283	24	2·17	22	3·005	2·51
July	1·99	NW, SW	3·20	1·40	..	....	25	W, SW	2 54	1·57	1·680	27	3·140	22	W	1·96	20	2·09	1·91	20	16	..	17	SW	1 472	2·010	25	15	SW, NW	1·70	1·925	14	1·50	17	2·009	3·03
August....	2·27	SE, NE	1·92	4·80	..	....	22	NW, W	6·81	5·29	5·458	22	3·315	11	W	4·33	12	3·51	3·47	15	13	..	10	SW, NW	5·140	5·917	16	13	Var.	3·51	1·767	16	3·20	14	4·210	2·23
September..	1·04	NE, SE	1·10	0·52	..	....	14	N,NE,NW	1·15	0·82	0·677	19	1·717	9	W, N	0·92	10	0·98	1·30	14	8	..	10	SW,SE,NE	0·853	1·087	13	13	E, W	0·86	0·980	10	1·24	17	1·019	2·94
October....	2·50	SW	2 90	1·54	..	....	21	NW, W	4·14	2·51	5·859	24	6 888	16	W, SE	1·98	20	2·27	1·87	18	13	..	12	SW	1·645	1·688	19	15	W	1·28	1 775	15	1·57	18	2·739	1·25
November.	1 27	N, SW	1·10	0·30	..	....	16	SW,NW	1·21	1·63	0·771	21	1·702	9	W	0·88	12	0·90	0·91	16	9	..	16	SW	0·681	0·790	17	12	W	0·76	1·000	15	0·89	12	0·985	4·60
December ..	0·96	SW, W	1·82	0·95	..	....	19	SE,NW,W	2·40	1·73	1·844	20	5·119	19	W	0·98	12	1·44	0·92	19	15	..	16	....	1·075	1·310	27	14	W	1·19	1·340	14	1·07	17	1·631	1·12
Total 1862	21·24	SW	25·81	19·30	..	....	250	W, NW	36·00	27·12*	30·042	291	44·209	196	W	26·00	199	26·49	24·68	211	185	..	194	SW	25 465	28 013	260	192	W,SW	21·00	21·593	196	21·82	207	26·933	26·96§
Total 1861	32·83	SW	24·54	18·30	184	SW	249	SW	26·27	..	26 170	282	49·354	201	W	26·22	213	23·80	23·54	200	197	19·58	..	W,SW	24·619	24·760	264	207	SW,W	24·49	....	139	24·28	191	26·96	....
Total 1860	31 86	...	30·28	27·48	235	SE, SW	273	W,SW	42 00	..	..	297	50·153	239	W,E, NW	35·26	259	38·00	31·28	219	242	27·40	..	W	34·119	32·186	290	214	W,SW	24·71	....	145	30·33	..	34·16	....
Total 1859	27·65	....	26·74	18·84	147	NW, SW	200	W, NW, E	31·87	..	25·976	259	47·708	190	W, E	27·85	182	27·31	25·15	153	170	18·41	..	W	23·515	..	171	171	SW,W	17·19	....	111	21·57	..	26·14	....
Total 1858	..	....	21·56	22·51	141	SW, W	183	W, NW, E	23 11	..	24·269	229	37·210	172	W, E	27·19	165	21·88	18 20	127	156	13·29	..	W,SW	....	..	172	172	SW,W	17 87	....	119	18·73	..	22·85	....
Total 1857	..	....	23·93	20 77	..	....	..	.....	28·79	..	27·115	..	41·798	..	....	28·86	..	27·55	24·47	133	..	16·43	..	....	....	..	..	..	.....	18·93	....	..	21·55	..	25·47	....
Total 1856	..	....	27·30	22·58	..	....	..	.....	41·69	..	32·896	..	45·484	..	....	35·06	..	29·82	29·25	146	..	21·22	..	....	....	..	..	..	.....	18·12	....	..	20 65	..	30·28	....

* GLANTON PIKE.—In this total the mean rain-fall for January is included, as the fall at this Station is omitted for the month.

† CRAMLINGTON.—Observations made at Gosforth after August.

‡ SUNDERLAND.—The return of the rain-fall in the first column is furnished by Dr. Ogden, that in the second by the Rev. G. Iliff: the gauges are a considerable distance from each other.

§ The mean total is incorrectly printed, 29·96, in the Report for 1861.

DATES ILLUSTRATIVE OF CLIMATOLOGY, 1862.

Place.	North Shields.			Seaham.			Greatham.			Whorlton.			Stamfordham.			Cambo.		
Forest Trees	In bud	In leaf	Divst'd of Leaf	In bud	In leaf	Divst'd of Leaf	In bud	In leaf	Divst'd of Leaf	In bud	In leaf	Divst'd of Leaf	In bud	In leaf	Divst'd of leaf.	In bud	In leaf	Divst'd of Leaf.
Alder	..	..	..	Mar 20	May 5	Oct 29	Apr 21	..	..	..	..	..	..	..	..	May 9	May 12	Nov 2
Ash	..	June 2	Oct 23	May 1	„ 20	Nov 15	..	..	..	May 8	May 16	..	..	Jun 21	..	„ 10	„ 23	Oct 16
Beech	May 1	May 11	„ 26	„ 1	„ 10	„ 1	..	..	..	Apr 10	„ 4	..	..	May 25	..	Apr 12	„ 4	„ 18
Birch	..	..	..	„ 1	„ 11	„ 1	..	..	..	„ 29	„ 1	..	..	..	..	„ 23	„ 9	„ 18
Elm	..	..	..	..	„ 7	Oct 12	Mar 5	..	..	Mar 16	„ 17	..	..	..	..	„ 23	„ 13	Nov 27
Larch	..	..	..	Mar 26	Apr 6	„ 20	Apr 3	Apr 26	..	Feb 22	Apr 14	..	Apr 11	May 10	..	„ 11	Apr 26	„ 25
Oak	..	..	..	May 1	May 20	„ 11	„ 29	..	..	May 5	May 19	..	May 15	..	..	May 10	May 26	„ 22
Poplar	..	..	..	Mar 29	Mar 24	„ 11	Mar 8	..	..	„ 16	„ 18	..	Apr 6	..	..	Apr 1	Apr 24	Oct 14
Sycamore	..	May 9	Oct 7	„ 29	Apr 27	„ 12	„ 20	Apr 30	Oct 14	Jan 25	Apr 28	..	„ 18	May 20	..	„ 22	„ 24	„ 18
Grain, Crops, &c.	Sown.		Cut.	Sown.		Cut.	Sown.		Cut.	Sown.		Cut.	Sown.		Cut.	Sown.		Cut.
Barley	April 10		Sept 16	April 29		Sept 10	..		..	April		Sept	April		Aug 30	April 4		Sept 3
Beans	..		..	..		..	..		..	..		..	Apr 4, 12		..	„ 10		„
Oats	April 11		Sept 29	April 28		..	..		..	April		Sept	Apr 4, 12		Oct 13	„ 7		„ 12
Peas	..		..	..		..	..		..	..		..	Apr 4, 12		..	„ 10		..
Wheat	Feb 28		Sept 27	April		Sept 9	..		..	..		Sept	..		..	..		October 6
Hay	..		..	..		July 10	..		..	May		June July	..		June 23	April 10		June 30
Potatoes	..		..	..		..	April 10		..	May		October	May 15		..	„ 13		..
Turnips	..		..	June 1		August 1	..		..	May		Nov	„ 26		..	May 9		Nov. 2
Birds, &c.	Arrival.		Departure	Arrival.		Departure	Arrival.		Departure	Arrival.		Departure	Arrival.		Departure	Arrival.		Departure
Black Cap	..		..	May 22		Sept	April 28		..	..		..	..		..	May 17		October 6
Chiff Chaff	..		..	„ 12		Sept 12	..		..	..		..	May 10		..	..		..
Corn Crake	May 13		..	„ 7		..	April 29		..	..		..	„ 6		..	May 18		..
Cuckoo	„ 12		..	April 29		Aug 12	„ 28		..	May 9		..	April 18		..	„ 1		..
Fieldfare	Oct 23		March 5	Nov 1		..	..		..	..		..	..		April 24	Nov 3		..
Redwing	..		..	Oct 20		..	..		..	..		..	..		..	„ 3		..
Redstart	..		..	April 27		..	April 29		..	..		..	..		..	..		..
Swift	..		July 28	May 25		Aug 10	May 1		..	..		..	May 3		..	May 7		..
Swallow	April 25		Sept 22	April 27		Oct 13	April 23		..	May 1		..	April 24		..	April 23		October 4
Wheatear	..		..	„ 1		..	Mar 26		..	..		..	March 24		..	..		..
Whitethroat	..		..	„ 27		Sept 12	April 29		..	..		..	April 23		..	..		..
Willow Wren	..		..	„ 25		„ 20	„ 29		..	..		..	..		..	..		..
Woodcock	Oct 11		..	Oct 29		March 24	..		..	..		..	..		..	..		..

DATES OF FLOWERING OF FRUIT TREES, SHRUBS, AND FLOWERING PLANTS.

NAME.	North Shields.	Seaham.	Greatham	Whorlton.	Stamford-ham.	Cambo.
Apple	May 7	May 3	May 2	May 9	May 25	May 10
Cherry.... Standard	..	April 20	April 24	April 27	„ 3	„ 7
Pear..... Trees.	April 28	„ 28	May 1	May 6	„ 18	„ 5
Plum	..	May 4	April 23	„ 2	„ 16	„ 8
Blackthorn	April 15	April 19	„ 24	April 13	April 27	„ 5
Bramble	June 6	June 9	..	July 20	..	July 4
Broom	..	..	..	May 9	June 6	May 23
Black Currant	April 30	April 21	April 17	April 26	..	„ 8
Flowering Currant	„ 6	„ 1	March 28	March 20	..	„ 1
Elder.....	..	June 21	..	June 15	July 3	June 1
Gooseberry	April 9	April 1	April 4	April 2	..	April 20
Hawthorn	May 20	May 23	..	May 22	..	May 28
Hazel	..	March 4	Feb. 24	..	..	Jan. 17
Honeysuckle	..	May 20	..	June	July 13	May 25
Laburnum	May 20	„ 24	..	May 20	June 5	„ 28
Lilac.....	„ 17	„ 19	..	„ 18	..	„ 24
Mountain Ash.....	..	„ 24	..	„ 19	..	„ 29
Privet	..	June 20	..	..	..	June 22
Rose	..	„ 12	..	May 28	..	„ 20
Sallow	..	April 4	April 10	..	April 6	..
Whin	..	Feb. 20	Feb. 15	Jan. 25	..	March 22
Anemone	..	April 1	April 17	April 7	April 29	April 15
Blue Bell	..	May 10	..	May 1	..	..
Coltsfoot	Feb. 18	Feb. 6	April 22	„ 10	March 7	..
Dandelion	April 4	April 4	..	April 18	April 10	April 20
Garlic	..	May 6	..	May 17	May 20	..
Lily of the Valley	May 20	„ 20	..	„ 20	„ 18	May 20
Primrose	March 17	Feb. 18	Feb. 10	March 21	April 10	April 5
Strawberry, Garden	May 7	May 10	..	May 12	May 20	May 18
„ Wood.....	..	„ 8	..	April 10	„ 28	April 4
Snowdrop	Feb. 3	Jan. 26	Jan. 31	Jan. 25	Feb. 19	Jan. 30

INSECTS.	Firstseen.	Firstseen.	Firstseen.	Firstseen.	Firstseen.	Firstseen.
Small White Butterfly..	April 28	April 28	..	..	April 26	May 17
Orange Tip „ ..	..	May 10	..	..	May 19	„ 19
Tortoise Shell „ ..	..	„ 5	April 29	..	..	April 3
Holly Blue „ ..	..	..	..	..	August 11	..
Brimstone Moth.....	..	..	..	..	June 29	May 20
Currant „	..	..	..	..	..	..
Ghost „	..	..	..	..	..	June 21
Small Dagger „	..	..	..	..	..	April 27
Cockchafer	..	May 9	..	..	..	..
Hive Bees	March 11	March 9	..	..	March 1	Feb. 14.
Humble „	„ 3	May 5	..	..	April 14	April 10
Wasp.....	May 5	„ 4	..	..	„ 28	„ 30

A List of Wild Plants growing within Three Miles of Tynemouth, with the dates of Flowering, &c., during the season, 1862. By John Coppin, Esq.

Tussilago farfara	February 18th
Ranunculus ficaria	March 10th
Lamium album	April 2nd
Lamium purpureum	February 13th
Glechoma hederacea	April 10th
Veronica hederifolia	March 13th
Veronica chamœdrys	May 5th
Primula vulgaris	April 4th
Primula veris	„ 16th
Viola canina.	„ 20th
Ribes grossulariata	„ 7th
Prunus spinosus	„ 15th
Cratægus oxyacanthus	May 20th
Trifolium pratense	„ 20th
Ranunculus arvensis	„ 8th
Potentilla anserina	„ 16th
Rosa canina	... ...
Bramble	June 4th

A List of the Dates on which the following Fruit Trees, Shrubs, and Plants first flowered in a Garden near North Shields.

Gooseberry	April 12th
Red Currant	„ 15th
Pear Tree (Jargonelle)	„ 20th
Apple Tree (Keswick Codling)	May 6th
Cherry Tree	April 25th
Yellow Crocus	February 19th
Purple Crocus	„ 23rd
White Crocus	„ 20th
Yellow Auricula.	April 6th
Lilac Auricula	... ...
Blue Hyacinth	May 4th
Lily of the Valley	„ 20th
Purple Lilac	„ 17th
Laburnum	„ 20th
Chrysanthemum	... ...
London Pride	May 13th

IV.—*On* Acantholeberis (*Lilljeborg*), *a Genus of Entomostraca new to Great Britain.** By the Rev. Alfred Merle Norman, M.A. [Plate I.]

Fam. Daphniidæ.

Genus Acantholeberis (Lilljeborg).

(Syn. *Acanthocercus*, Schödler.)

Anterior antennæ large and conspicuous, porrected from the front of the head. The upper branch of the posterior antennæ four-jointed, and bearing at its termination three plumose setæ and a spine: lower branch three-jointed, and having the first joint provided with a remarkably long-spined seta, the second also furnished with one very long seta, and the last joint terminating in three setæ and a spine. The postero-ventral angle of the carapace is fringed with very long setæ of a spine-like character. Feet five pairs. Intestinal canal simple and straight at first, but furnished with a loop near the anus.

The genus *Acanthocercus* was founded by Schödler, in the 'Archiv für Naturgeschichte' for 1846, for the reception of a remarkable Entomostracan which Müller had described in the 'Zoologia Danica,' under the name of *Daphne curvirostris*. Fitzinger had, however, established a genus of reptiles under the same name three years previously; and Lilljeborg, therefore, in his work on the Entomostraca (De Crustaceis ex ordinibus tribus Cladocera, Ostracoda, et Copepoda in Scaniâ occurrentibus) changed the name of the genus to *Acantholeberis*.

In general characters *Acantholeberis* is closely—perhaps almost too closely—allied to *Macrothrix* (Baird). The resemblance is seen in the general form of the carapace and of the organs of the body, but especially in the large size and position of the anterior antennæ, and in the peculiar and exceptional structure of the long seta of the first joint of the lower branch of the posterior antennæ. The chief differences are to be found in the number of setæ on the upper branch of the posterior antennæ, which in *Macrothrix* are four, but in *Acantholeberis* only three; and in the fact that there is a loop in the intestinal canal of *Acantho-*

* This paper appeared also in the *Annals and Magazine of Natural History*, for June.

leberis towards the posterior extremity below the point of attachment of the fifth feet; while in *Macrothrix* there is no such fold, the course of the canal being straight.

In 1858, Lievin described a second species of the genus; but his *A. sordida* shows such marked points of divergence from the type as to make us doubt whether the genus has been founded on sufficiently good grounds, and whether it should not rather be united with *Lathonura*, Lilljeborg (=*Pasithea*, Koch), and *Macrothrix*. *A. curvirostris* and *A. sordida* are the only known members of the genus, and both these species have now been found in Great Britain.

Acantholeberis curvirostris (Müller). Pl. XI. figs. 1–5.

Daphne curvirostris, O. F. Müller, Zool. Dan. Prod. p. 200. No. 2403.

Daphnia curvirostris, O. F. Müller, Entomostraca, p. 93, pl. 13. f. 1 & 2.

Acanthocercus rigidus, Schödler, Archiv. für Naturgeschichte, 1846, B. i. p. 301, pl. 11 & 12. Lievin, "Die Branchiopoden der Danziger Gegend," Neueste Schriften der Naturforschenden Gesellschaft in Danzig, B. iv. p. 33, pl. 8. f. 1–5. Leydig, Naturgeschichte der Daphniden, p. 195.

Acantholeberis curvirostris, Lilljeborg, De Crust. ex ord. Clad. Ostrac. et Copep. p. 52, pl. 4. f. 3–7, & pl. 23. f. 10, 11.

The carapace is somewhat oblong in form, rather truncate below, and with the hind margin nearly straight, since the matrix is but little protuberant in the gravid female. The head does not lean forward, as is usually the case among the Daphniidæ, but is remarkably upright. To the upper point of the beak the anterior antennæ (Pl. I. fig. 2) are attached, and from it they are projected at nearly a right angle. These organs are very large, and strap-shaped; they are slightly serrate on the upper margin, and gradually widen towards the extremity, which is furnished with six or eight cylindrical tentaculiform filaments. The supplemental eye-spot is situated close behind their bases, and is very small.

The posterior antennæ are long and slender; their peduncles are not very muscular, are corrugated on the basal half, and bear a few minute spines on the surface towards the distal extremity. The upper and four-jointed branch of these antennæ has the first articulation very small, the second considerably longer, and furnished with a spine on the upper margin, but no seta; the third is unprovided with appendages; the fourth terminates in three two-jointed plumose setæ and a spine, which does not equal one-third of the basal portion of the setæ in length. The first joint of the lower branch bears an unusually long two-jointed seta of remarkable character, and which, indeed, forms one of the chief features in this interesting Entomostracan. The basal portion of this seta is provided with short cilia on the outer or upper margin, while the inner margin is smooth; the second portion of the seta (Pl. I. fig. 3) has a series of rather distant spines upon the outer margin; and between these spines a high power of the microscope shows a fringe of short, closely-set cilia. The second joint of the lower branch of the posterior antennæ bears another seta of great length, which differs, however, in its armature from that of the first joint. The seta is plumose on both margins throughout its entire length; and between the longer hairs of the outer margin of the distal portion are short closely-set cilia (fig. 4), similar in character to those between the spines of the seta which is attached to the first joint. The third joint ends in three two-jointed plumose cilia and a spine.

The labrum has a large and conspicuous, much elevated, acutely papilliform process in front. The terminal portion of the abdomen is bordered with a closely-set array of spines, and has the sides, moreover, thickly studded with an admixture of slender spines and hairs. The abdominal setæ are long, while the terminal claws (fig. 5) are rather short, a little flattened, and minutely pectinated along the edges. The ventral margin of the carapace is fringed throughout its entire length with plumose setæ; and these setæ attain an extraordinary length at the angle formed by the junction of the ventral and posterior margins.

Acantholeberis curvirostris was discovered last summer by Mr. D. Robertson, in the Isle of Cumbrae in the Frith of Clyde, living in some abundance in a small shallow pond about twelve feet square, which has been cut out of the sandstone rock, and was covered at the bottom with moss and Confervæ. Mr. Robertson informs us that though the species seems fond of remaining quiety among the weeds, it nevertheless is tolerably active when swimming, which it effects with a slight jerking motion, often in curves. It has a habit of mounting to the surface of the water, and then allowing itself passively and slowly to sink to the bottom, with its antennæ spread out on either side. It rarely resumes active motion when in its downward course, unless it is disturbed.

A second locality for the species is Crag Lake, Northumberland, where it has been met with, during the present spring, by Mr. G. S. Brady.

Acantholeberis sordida (Lievin). Pl. I. figs. 6-9.

Acanthocercus sordidus, Lievin, "Die Branch. der Danziger Gegend," Neueste Schriften der naturf. Gesells. in Danzig, B. iv. p 34, pl. 8. f. 7—12. Fischer, Bull. de la Soc. Imp. des Nat. de Moscou, 1854. Leydig, Naturgeschichte der Daphniden, p. 199.

Carapace nearly round, widest below, and slightly truncate on the inferior margin, tumid, and having the surface clothed with short hair. Anterior antennæ largely developed, long, cylindrical. Posterior antennæ short and stout; their peduncles very large, stout, and powerfully muscular. Both branches very short, the separate articulations being scarcely longer than they are broad, and the total length of the branches barely exceeding the width of the bases of the enormously developed peduncles. Upper and four-jointed branch terminating in three plumose setæ and a long spine, which equals two-thirds the length of the basal portion of the setæ. Lower and three-jointed branch having a seta at the extremity of the first and second joints, and three setæ and a spine at the termination of the third joint. The setæ of the first two joints do not differ materially in char-

acter from those at the extremity. The last portion of the abdomen (Pl. I. fig. 7) is in the form of a somewhat flattened semicircular plate, margined with large spines. The claws are large, produced, simple, and cylindrical. Just below their base is a cluster of small spines, which are succeeded by some still smaller spines; behind these the spines increase in size, becoming both numerous and large. The abdominal setæ are long and slightly plumose. The ventral edge of the carapace is fringed with plumose setæ (fig. 8); but at the posteroventral angle these setæ become much longer, assume quite a spine-like character, and bear, as it were, smaller spines attached to one side (fig 9). The entire animal is of a brilliant crimson colour.

This Daphnian is remarkable alike in history and in habits. On examining with a hand-lens the vegetable matter in a bottle of water brought home from a clear pond which had been cut out of the limestone rock, to contain water for the supply of the engine at a now unworked colliery at Bishop Middleham, in the county of Durham, a small blood-red Entomostracan, which was lying upon its back in the water, attracted attention; and on further search, two more individuals were found in the same bottle. They at once became a source of great interest; for *A. sordida* is the most helpless animal possible. It is totally unable either to swim or to walk. The setæ of the antennæ are apparently of insufficient length to confer the power of swimming; and the feet in this family, though valuable agents in respiration, are quite unfitted in their structure for purposes of locomotion, and, indeed, being contained within the carapace, could not by any possibility be used for the support of the body. The animal therefore lies upon its back, kicking and struggling, swinging to and fro its brawny arms (the posterior antennæ), and thrusting in and out of the carapace-valves its largely developed and strongly spined abdomen in the vain attempt to push itself from place to place; but the efforts, though most vigorous, are of little avail, and its progress is extremely slow. It is probably in consequence of these sluggish habits, and of the animal rolling itself in the mud, as well as owing to the pilose covering of the shell, that it owes the coating

of mud, Diatoms, and Desmids which render it so difficult a matter to see the structure of the organs of the body contained within the carapace. That the coating of extraneous matter is the effect, and not the cause, of the inability of the animal to swim is proved by the fact that one of the specimens obtained, which was sent to Mr. G. S. Brady for the purpose of obtaining his kindly extended and valuable aid in the delineation of the species, gave birth to five young while in his possession; and he informed us that though these young when first born, were able to raise themselves slightly in the water, yet it was not more than about half an inch, nor could this be effected without great effort, or, apparently, without the assistance of the sides of the vessel in which they were contained; and when two or three days old, even this limited power of locomotion was lost. Mr. Brady wrote to us the following vivid description of the motions of these young specimens:—"It is a sight to see the brutes swim, or *try* to swim, under the microscope. When a good view from the dorsal aspect is obtained, one sees that they put their two great antennæ together, and strike out in a good bold sweep like any Christian, the superior antennæ working synchronously, but in a smaller arc, inside the greater ones. The motion of these lesser antennæ is very beautiful; and the muscular contractions in the basal joints of the greater ones are remarkably plain, throwing the limb into great wrinkles. When the animal is tired of this sort of exertion, it stops its arms, and begins working its branchial apparatus at a great rate; but, so far as I can see, the two systems are never in active motion together. They seem to attract dust and parasitic growth; for, though kept in simple water, they are surrounded with confervoid filaments, Diatoms, Oscillatoriæ, &c."

Another remarkable feature in the history of this Daphnian is the great scarcity of the species individually. As a rule, where an Entomostracan occurs at all, it is to be met with in abundance. This is very far from being the case with *A. sordida*. Failing in the attempt to make out the structure of the three specimens we had obtained in the Bishop-Middleham colliery pond, and being unwilling to destroy them by attempted dissec-

tion, we hoped to render the dense character of the carapace-valves more transparent by mounting them in Deane's medium. The result was far from satisfactory. The pond was therefore revisited in the hope of again finding the species, and this not once, but many times; but, though the greatest trouble and care were taken, no further specimens could be met with. Subsequently, however, a single example was obtained under precisely similar circumstances to those under which the former had been taken, among material collected in the Forge Dam at Sedgefield, a spot about two and a half miles distant from the first locality. It is from this example that the figures and description of this paper have principally been derived. All after-attempts (and they were not a few) to procure this species in the Forge Dam were as unavailing as they had proved in the case of the colliery pond.

We had at first thought that this abnormal species might be new to science; and when we found the description of this animal in Leydig's work, we could not help being amused at the remarkable parallelism between our own experience and that of Fischer and Leydig; and we are afraid that it was some consolation, after the great trouble that had been taken in the vain attempt to obtain additional specimens, to learn that other naturalists had suffered precisely similar disappointments. Fischer says that he could only find a single specimen, and therefore is obliged to content himself with referring to the description of Lievin; and Leydig writes, "I have only once observed *Acanthocercus sordidus* in a muddy lake at Tübingen. It was a single specimen, which struck me by its blood-red colour, and also by the ample investiture of mud which surrounded the animal. Added to that, it did not swim, but crept slowly along the bottom of the vessel. Circumstances prevented my drawing the animal, and every subsequent trouble I took to find the animal again was in vain."

We have already referred to the fact that this species does not appear to embrace all the characters which are assigned to the genus *Acantholeberis*. It agrees with *A. curvirostris* in the number of setæ attached to the posterior antennæ, and also in the

presence of setæ of great length at the posterior ventral angle of the carapace. It differs in the fact that the setæ of the first two joints of the lower branch of the posterior antennæ are short, and do not vary in character from the ordinary plumose setæ of the Daphniidæ. But a more important instance of divergence would appear to exist in the structure of the intestinal canal, which does not seem to possess a loop near the excretory orifice, as in *A. curvirostris;* nevertheless a great dilatation of the canal exists in an analogous position, forming apparently a strong muscular rectum. At the same time, we speak with hesitation as our opportunities of investigating the structure of the species have not been sufficient to enable us to decide with certainty this and other points.

EXPLANATION OF PLATE I.

Fig. 1. *Acantholeberis curvirostris* (Müller), ♀

Fig. 2. Anterior antenna of the same species.

Fig. 3. Portion of the terminal half of the seta attached to the first joint of the lower branch of the posterior antennæ; greatly magnified.

Fig. 4. Portion of the terminal half of the seta attached to the second joint of the lower branch of the posterior antennæ, greatly enlarged.

Fig. 5. Abdominal claws.

Fig. 6. *Acantholeberis sordida* (Lievin), ♀

Fig. 7. Abdomen of the same species.

Fig. 8. Setæ from the ventral margin of the carapace.

Fig. 9. Setæ from the posteroventral angle of the carapace.

V.—*Coleopterous Insects added to the Fauna of Northumberland and Durham in* 1862. By Thomas John Bold.

1. *Gyrinus bicolor*, Payk.

This very nice addition to our local fauna was taken by the Rev. R. Kirwood, in some pools of water near Darlington, which are known as "Hall Kettles," or vulgarly as "Hell Kettles."

2. *Aleochara Kirbii*, Steph.,=*griseus*, Kr.

Very abundant on our sea coasts, sheltering in the tangled herbage of the sandhill. It is closely allied to *obscurilla* from which it may be known by its larger size, and its more sparingly punctured abdomen.

3. *Quedius semiæneus*, Kirby=*semiobscuris*, Fr., E. C. Rye, Entom. Annual 1863, p. 80.

This species is common throughout our district; occuring most plentifully on the sea banks. I have also taken specimens in Cumberland, and I found it not rare at Tain, in Rossshire.

4. *Philonthus punctiventris*, Kraatz, E. C. Rye, Entom, Annual, 1863, p. 82.

Apparently very rare, I have two local specimens.

5. *Philonthus temporalis*, Mulsant, Opuscules, E. C. Rye, Zoologist.

This newly detected British species would appear to be very rare. I have one specimen only, which was taken at Long Benton, in May, but under what circumstances I had neglected to note. Mulsant says that it is found in agarices. I have apparently two other unrecorded species of large *Philonthi;* one of these Mr. Rye thinks may prove to be *P. tenuicornis*, Mulsant; the other comes near to *metallicus* of Grav., and Boisd. and Lacordaire, Faun. Entom. 1, 390, 7.

6. *Coryphium angusticolle* (Kirby), Steph.

Very rare, only one specimen taken.

7. *Omalium riparium*, Thomson.

The characters of this distinct species have been recently pointed out by Mr. Waterhouse. Hitherto it had been

confounded with *lævigatum*, with which it is generally found associated; living beneath algæ, on the sea coast. I have taken both species freely, from Hartley to Tynemouth; and from South Shields to Sunderland; in especial abundance in the small indentations between Marsden and Whitburn.

8. *Omalium cæsum*, Gray.

Met with at Gosforth, Long Benton, Hartley, and Newcastle. Occurring from June to October.

9. *Choleva grandicollis*, Erich., E. C. Rye, Entom Annual 1863, p. 89.

Not uncommon beneath dead birds, and small mammalia. I have generally found it to frequent dry woods.

10. *Choleva Kirbii*, Spence, E. C. Rye, Entom, Annual 1863, p. 90.

With us this is more abundant, and frequents much the same places as the preceding. Mr. Rye has, I think, judiciously separated both from *tristis*.

11. *Meligethes seniculus*, Er.

The insect recorded in last year's report, as *M. tristis*, proves to be the above, a closely allied species.

12. *Meligethes flavipes*, Sturm.

Near Hartley in October.

13. *Meligethes picipes*, Sturm.

Taken at Hartley, South Shields, and Gosforth.

14. *Cryptophagus affinis*, Sturm.

I have several specimens of this, which were taken at Long Benton, and Newcastle, in June, July and August.

15. *Atomaria peltata*, Kraatz.

Rare; Gosforth, May.

16. *Atomaria Berolinensis*, Kraatz.

Rare; Long Benton, South Shields, July.

17. *Atomaria fuscata*, Schonh.

Also rare; Marsden, Long Benton.

18. *Atomaria munda*, Erichs.

Very rare; Gosforth, Cullercoats, September.

19. *Atomaria apicalis*, Er.

Very rare; Long Benton, September.

20. *Orchesia micans*, Panz.

Bred from a fungus (*Polyporus radiatus*), growing on Alder, near Wooler, by Mr. James Hardy.

21. *Carida flexuosa*, Payk.

This handsome addition was also made by Mr. Hardy, who found it in the above mentioned fungus, on gathering it. Gyllenhal records this insect as occurring under similar circumstances. ["Habitat in fungis arboreis, præsertim alni"] in Sweden.

22. *Sitones Meliloti*, Walton.

I have sought for this insect for some years without success, but found it at last near Hartley, on some tufts of Melilot trefoil (*Melilotus officinalis*), in Sept. and Oct.

23. *Longitarsis flavicornis* (Kirby) Steph.

Not common; sea banks near Hartley.

24. *Longitarsis atricapilla*, Dufts.

Banks near Hartley in August, and at Gosforth in July.

Allard's "Essai Monographique sur les Galerucites Anisopodes (Altises),"* will be found of great use in clearing up doubts in this tribe of insects; and it is of especial use to the English student, as Mons. Allard was furnished with types of, and comprehensive notes on the British species, by Mr. Waterhouse.

25. *Scymnus Mulsanti*, Waterh.

Not rare, Blyth Links and elsewhere. Mr. Waterhouse has most ably pointed out the differences between this species and *discoideus*.

26. *Scymnus ater*, Kugel.

Rare; same locality as preceding.

27. *Corticaria denticulata*, Gyll.

The most abundant of the denticulate species; Long Benton, Axwell, Gibside, Sunderland and elsewhere, in September.

28. *Corticaria serrata*, Payk.

Very rarely met with.

* Paris, A. Deyrolle, Extracted from the French Annals.

Mr. Waterhouse's paper in the "Transactions of the Entomological Society of London," will enable the student to separate with ease the species of this intricate genus.

29. *Rhinoncus bruchoides*, Herbst=*Pachyrhinus rufescens*, Sreph.

I have a single specimen of this beautiful creature, taken, I believe, at Gosforth.

30. *Pissodes notatus*, Fab.

The Rev. R. Kirwood has recently shown me a pair of this fine insect, which he captured in Sunderland, where it had no doubt been brought by some of the Scotch timber laden ships. I have specimens, taken near Elgin, in my own collection.

VI.—*On the English Sea Fisheries.* By the Rev. R. F. Wheeler, M.A.

It is with some hesitation that I venture to bring the subject of our English Sea Fisheries before the members of the Tyneside Club; and it is rather with the hope of calling forth information from others, than from thinking that I can impart any of any particular value, that I have drawn up the paper I am about to read.

There cannot be the slightest doubt as to the importance of our sea fisheries. Fish forms no small part of the food of all classes of the population, but the *lower* in the scale of society we descend, the more important does it become. Let any one examine the poorest neighbourhoods of any large town, and they will need no argument to convince them of this. They will find that nearly every small dealer in provisions includes within his stock an ample supply of red herrings and other cured fish; that, if the examination be made at the proper hour, there will also be found unnumbered itinerant dealers, whose whole object is to dispose of fish—perhaps none of the finest or freshest—which has been in vain offered to more wealthy purchasers. Or, if such an examination be thought unpleasant, let any one, after travelling up to London by the night mail, take a quiet stroll

some fine May morning through the streets as far east as London Bridge; let him turn down to Billinsgate, and if he will be content to remain in that locality from the opening of the market, about five a.m., till between eight and nine o'clock, he will witness a scene which for busy activity and rapid trade I believe can scarcely be equalled anywhere. As a naturalist too, he will see a display to interest him which he would never find elsewhere. At the opening of the market, which is a very leisurely process now, and later than it used to be in bygone days, the spectator will see but a few empty stalls and half sleeping men putting up the tables, drawing up baskets and packages of fish, arranging them by the stalls of the respective salesmen to whom they have been consigned; while others are far more quickly and actively engaged in supplying peripatetic breakfasts to those whose calling is in the market at that early hour. Ere long business begins. Agents of the chief fishmongers at the west end are amongst the earliest visitors. It is their business to secure for their employers the very best fish which the market can supply; and there as elsewhere the old adage still holds true, "The early bird picks the first worm." But in the meantime an assemblage of curious looking barrows, or rather large wooden trays mounted on wheels, has gradually gathered in Thames Street. Every spot not occupied by the huge railway vans, which have already began to assemble from the various railway stations, freighted with loads of fish from every part of the coast, is occupied by these peculiar barrows. Thames Street is full of them from above London Bridge to below the Custom House. Each narrow lane we go up would be rendered impassable by them but for the good humoured exertions of the police, who rather enjoy the chaff and banter of the owners of the vehicles, and from time to time join in the laugh from some outburst of that peculiar wit which is never wanting in a London crowd. As soon as the chief fishmongers are supplied then begins the market for these men; and it is easily seen who are the largest buyers of that large mass of fish which is daily poured into London.

Some slight idea of the enormous importance of the fish trade

may also be gathered from the quantities of fish conveyed by the different railway companies to London during the year 1862. From returns obligingly furnished to me by the different railway companies, I find that the Great Eastern conveyed 29,680 tons; the Great Northern 11,930 tons; the London, Brighton, and South Coast 5,174 tons; the South Eastern (Dover) 3,218 tons; and the Great Western 2,885 tons. There was also conveyed over the North Western to its different stations 27,896 tons, and on the North British line 8,303 tons. I am not aware what the figures are which represent the traffic on the Midland; the London and North Western; the London and South Western; the London, Chatham, and Dover, and other chief lines in various parts of England, but it must be a very large quantity altogether. Neither have I been able to ascertain the quantity delivered at Billingsgate, from the numerous smacks which from time immemorial have supplied that world famous market; but I should imagine that it outstripped the railway supply many times over.

As an example of the consumption of a single town, I may mention that from a return most obligingly supplied to me by Mr. Heron, the Town Clerk of Manchester, it appears that the average weight per week of fish coming to Manchester market is as follows:—

	Tons.
Trawl caught fish from Hull, Grimsby, and Scarbro'	100
Fish caught by hook and line from the east coast	30
Crabs and Lobsters, ditto	4½
Herrings, ditto	100
Herrings from the west coast	20
Fish caught by trawl ditto	20
Fish caught by hook ditto	5
Shell Fish, including Oysters, Cockles, and Mussels	60
Salmon from Ireland, during June, July, and August	40
Being a weekly average of	379½

The population of Manchester and Salford at the last census was about 460,000; and it would thus seem that the consumption of fish approximates towards 100 lbs. per head per annum for the whole population, including, of course, women and children of all ages.

If it were possible to obtain accurate statistical returns of the fish taken and sold in England—which it is not, and never will be—I think that it would probably be found that, excluding all those fish which are of minor consequence, and that great host which are of no use as food, the order of importance would be as follows:—

1. Herring.
2. Cod and Ling.
3. Soles, Plaice, and flat fish generally.
4. Haddock and Mackerel.
5. Pilchards.
6. Sprats and Eels.
7. Shell Fish—Crabs, Lobsters, &c.

I make no mention of Salmon, as that is a river fish as well as a sea fish, and *for the present* must be regarded rather as a luxury than otherwise; and for the same reason I omit oysters. They are a luxury both to poor and rich; perhaps most so to the poor man who stands at the street sellers stalls, illumined by the light of a half-penny dip stuck into the neck of a ginger beer bottle, and choosing from the penny piles of oysters which are laid out in tempting array before him, awaits—vinegar bottle in hand and pepper castor close by—with eager eyes the process of opening, and then, having duly drenched and peppered his victim, swallows it down with no inaudible smack.

It may be mentioned in passing that the Whitstable Oyster Company received for Oysters, in 1859, no less than £62,000, £50,000 being for natives and £12,000 for other kinds. About 500 million oysters are annually sold in Billinsgate, of the value of about half a million of money. One large London fish salesman estimates the *daily* consumption of lobsters in Great Britain at 40,000; about two-thirds of these come from Norway. About 600,000 crabs pass through the hands of the London salesmen yearly. Five million whelks are swallowed yearly by the Londoners; and 50 million mussels, 70 million cockles, and 300 million periwinkles pass down the throats of the poorer Londoners year by year.

Herring.

The herring fishery is the first great one which claims our attention. It is one of immense importance to the country. In Scotland and the Isle of Man, according to the returns of the Commissioners of British Fisheries, there were in 1861 42,751 fishermen and boys, 997 fish curers, 1,880 coopers, and 46,456 other persons, or a grand total of 92,084 people directly dependant on this fishery. The number of boats employed was 12,961, and their registered tonnage 94,154 tons. The estimated value of the boats, lines, and nets, was £783,037. In a return which I have obtained, I find that the take of herrings on the east coast of Scotland—that is from Northumberland to the Lewis—was, in 1852, 484,055 crans, and the value would be upwards of £600,000.

From Orkney to Northumberland 5,277 boats were engaged in the fishery last season. Wick is the head quarters of the Scotch herring fishery. From returns furnished to me, I find that the take per boat has been most materially decreasing there. Taking the average from 1836 to 1862, twenty-six years, I find that it would be about 105 crans per boat; but for the last six years it has only averaged 82 crans per boat. During the twenty years preceding 1856, on only three occasions did the average per boat fall below 100 crans; thus shewing a gradually decreasing return for the labour expended. This is the case with nearly every kind and sort of fishery in England. The total quantity exported from Wick was about 105,000 barrels.

The Customs Returns give the total export of herrings from the United Kingdom to Prussia, Hanover, and other countries, during 1862, as having been 510,411 barrels, of the declared value of £690,349.

There is no possibility of obtaining any accurate information of the herring fishery around the English coasts; but it is a very valuable one, and gives employment to some thousands of fishermen during several weeks in the year. The chief stations are in Northumberland, the Yorkshire coast, and Yarmouth. The mode of fishing is everywhere by drift nets. These are nets which hang perpendicularly in the stream, sustained by floats

and a long rope, the end of which is securely fastened to the boat. It drifts with the tide. The mesh of the net is an inch from knot to knot. The number of nets carried by each boat varies from seventeen to thirty; at Cullercoats the largest boats carry twenty. Each net is fifty yards long and twelve yards deep. The nets are fastened end to end. The number of nets carried by each boat has been increasing all along the coast for the last few years; but the take of fish has decreased.

As the shoals of herring swim along, they are entangled in the meshes of the net, which are of just sufficient size to admit the head of the fish. When the net is hauled in, the fish are, of course, nearly all alive, though they very soon die, like all fish with large gills and which swim near the surface. I am told by the fishermen that very often indeed the herring, when the net is hauled on board, utter a sound not by any means unlike a child's squeak.

The food of the herring consists of crustacea, varying in size from those of microscopic dimensions to those of a shrimp, and small fish, particularly sand eels. While young, they feed most voraciously.

Most of those now present have, doubtless, often watched the very picturesque sight which the little Bay at Cullercoats presents during the herring season, when the hour for the boats to take their departure is at hand, and the fires are being lighted, and one after another sails off to sea. I think that on a clear, dark night, the scene presented by the boats when off shore, stretching away in a long line, or bending round in a semi-circle, each with its blazing light, is one of the prettiest sights which our coast ever presents.

The herring is a somewhat capricious fish, and I am sorry to say is not now nearly so abundant off the east coast of England as formerly. On this point I have evidence from every station between Berwick and the Tees.

At Cullercoats, the quantity taken has most seriously decreased during the last few years. There are now forty-seven boats engaged there in the herring fishery. Last year was the worst season ever known. The average take of the whole num-

ber of boats was not more than 1,500 fish per day—of course giving a mere fraction to each. In bygone years it was no uncommon thing for the boats to come ashore with from 12,000 to 14,000 herrings per boat, and they were taken close in land, while now the fishing is not carried on in water much less than fourteen fathoms deep. About fifteen years ago, the herrings were so plentiful that they were sold at 2s. 6d. per thousand. The lowest price last year (1862) was 20s., and in 1861 18s. per thousand. The reports from the Durham coast are to the same effect.

From the Lincolnshire coast I learn that for the last two years the herring fishing has been a total failure. About two years ago, tons upon tons of sprats, or rather small herrings, were brought into Boston and sold for manure.

Cod and Ling.

I now pass on to the second class of fish on my list, cod and ling.

The cod fishery is a thoroughly historical one. As far back as the reign of Queen Elizabeth there were 260 ships employed in this fishery off Newfoundland. In 1663 a document was issued by Charles I., desiring the Lord Treasurer and others "to erect a common fishery for the nursery of seamen, which contained the first regulations for the governing of His Majesty's subjects inhabiting Newfoundland and trafficking in the Bay." Subsequent Acts were passed, which I have not time to notice. In 1814 the exports of fish and oil amounted in value to nearly three millions of money. I know not what the produce may be now, but the artificial stimulus of the bounty having been withdrawn, and in consequence of one of those curious instances of Governmental action which, done quietly and in too great ignorance of the subject on which action is taken, produce effects not thought of at the time, I should not be surprised to find that the English cod fishery on the distant Bank of Newfoundland is not nearly now what it was *then* in value. The circumstance to which I refer is a treaty concluded between our Government and France in 1857, by which the English Government

literally handed over the most valuable part of the Newfoundland fisheries to the French, granting to them the *exclusive* right of occupying large tracts on the coast, for the purpose of cleaning, packing, &c., with rights of a judicial and imperial nature. This treaty was repudiated by the Nova Scotians as soon as it became known; and as their acceptance was necessary to its validity, it was *legally* null and void; but the French having actually got possession of the land had no mind to abandon their position easily, and so, as I am informed, the place is still kept.

The cod is always caught by lines and hooks, except to a limited extent, I believe, in Norway, where nets are partially used. It is very voracious, and will take almost any bait. Mr. Couch, the well-known naturalist, has taken thirty-five crabs (none less than the size of a half-crown piece) out of the stomach of one cod. It is calculated that the cod and ling actually caught and cured on the Scotch coast in 1861, would, if left in the sea, have destroyed more herring than 48,000 fishermen. As only 42,751 fishermen were engaged, the magnitude of this destructive agency will readily be perceived. One man has been known to catch 400 to 500 fish on the Banks of Newfoundland in the course of ten or eleven hours; and eight men to take 1,600, on the Dogger Bank, in the course of a single day. Man's destructiveness *added* to that of the natural enemies of any fish must soon thin the stock, however prolific the fish may be.

The returns for the cod and ling fishery of Scotland and the Isle-of-Man give a total of 2,374,948 fish caught in 1861, and 26,961 cwts. were exported. There were 111 vessels engaged in the fishery there, employing 1,134 men.

It is estimated that about half a million fresh cod are annually sold in Billinsgate. I do not think that it is too high an average to estimate their value at from 3s. to 4s. each; and that will give, say, £175,000 as the annual value of this one fish in one market. I find that the average imports into *Ireland*, chiefly from Shetland, of dried cod and ling, are stated to amount to about 1,200 tons a year, which, at the low wholesale price of £23 a ton, would give £27,600 for the Irish import trade alone.

Of course much is caught around the coast as well. The total quantity of dried and cured fish, besides herring (and of which cod, ling, haddock, and pilchards are the chief), exported from *England* amounted in value to £191,855 in 1862.

The cod is extremely prolific. The roe of the female has been estimated to contain from four to nine million of eggs. It spawns about February. It is found in all parts of the Atlantic Ocean and in the Arctic Seas, but not in the Mediterranean. It loves deep water—from twenty-five to forty and even fifty fathoms. The well boats in which it is kept alive were invented, I believe, at Harwich about 1712.

Haddock and Mackerel.

I now pass on to the fourth on my list of important fishes—haddock and mackerel—leaving soles, plaice, and other kindred fish to the end of this paper, for reasons connected with the mode of fishing for them.

The haddock is found all around the coast of Great Britain, from the extreme north to the Land's End, and all around the shores of Ireland; but it is not found either in the Baltic or the Mediterranean. They are probably more abundant from Yarmouth to the Tyne than elsewhere in England. The most common size of a haddock is from two to four pounds; but one was caught at Cullercoats within the last few weeks (February 1863) weighing upwards of fourteen pounds. The ease with which the haddock can be cured renders it a fish of great value.

As regards the mackerel, they seem to be less known in the North than in the South and West of England; but it is a very important fishery. As the year commences, so these fish begin to move from the deeper waters of the Atlantic, and are found at the entrance of the British Channel and near the Scilly Isles. Mr. Couch mentions that in the earlier movements of these fish the sexes are divided, and the males go before the females in the course of their migration. Out of twenty examples taken indiscriminately in March, sixteen were males. On another occasion, from a capture of 7,000, seventeen out of twenty were males.

The number of boats engaged in this fishing is uncertain, but about 200 have been known to assemble at Plymouth at one time; and more than that number belong to Cornwall alone. They are manned by from five to eight men each. An ordinary boat will carry fifty nets, each measuring twenty-two fathoms as prepared for fishing. The mode of using these nets is similar to that just described as for herring fishing. The fishing is carried on in the evening and towards morning. The passing of day into night, or night into day, is the best time for all fishing. After being down in the sea for about two hours the nets are hauled in piece by piece. The fish are carried off to market by vessels solely employed for that purpose. The mackerel spawn in May and June. The mode of fishing is then altered, and the sean net, presently to be described, comes into use. The mackerel is one of the few sea fish whose capture is pursued as a sport, and it is said to be rather an exciting occupation. They are then, of course, taken by hook and line.

The average price of mackerel is about £6 to £9 a thousand. The average take per boat during the last seven years, off the Coast of Cornwall, may be put down at 15,000 to 24,000 per boat. About twenty-five millions are sold in London yearly.

Pilchard.

I now come to the Pilchard. Pilchards are to Cornwall very like what coals are to Newcastle. It is *the* Cornish fish. They are never seen in the North Sea, and only a stray one or two is found at times even as far east as Dover. They are found in small numbers on the French coast, and also on that of Spain.

The fishing is carried on by drift nets, similar to those used for mackerel and herring, and by seines or seans. In the drift net boats, the number taken varies much. From 5,000 to 10,000, according to Mr. Couch, being considered moderate. It often amounts to 20,000. But the chief method of fishing is by seans. The following description is chiefly from Mr. Couch's pen.

When a shoal of pilchards is expected, a man called a huer—so called from the old word *huer*, which means to give an alarm, and is still familiar to us in the well-known words "hue

and cry." The huer stands in some commanding position; he first looks for a slight discolouring of the sea, something like a leaden cloud passing over its surface. This is a schull or shoal of pilchards. As soon as he sees the shoal of fish approaching the land, he gives a signal, which others standing near take up, and pass down to the beach. His purpose is now to direct the operations of those who have gone off in the boats—three in number for each party. The *stop* sean is a long net 1,200 feet in length, and 72 feet in depth. It is buoyed along the head rope with corks, and weighed down with lead. The first boat carries this net. A second boat, called the volyer, has a seine from 600 to 720 feet long, and about 108 feet deep at its deepest part. This is called the *tuck* sean. It differs in shape as well as dimensions from the stop sean, the middle being formed into a hollow. The third boat is called the lurker, and has no sean. The crew attending a sean consists of eighteen men and one or two boys; seven of these are assigned to the large boats, and the remaining four, including the master seaner, to the lurker. When the presence of the fish is discovered, the lurker proceeds to the place to ascertain the size of the shoal and the direction in which it is moving. When everything is favourable, a warp from the end of the sean is handed over to the volyer, whose place it is to keep all taut; the lurker continuing near the fish to watch their motions, and to point out to the sean boat what is to be enclosed.

The sean boat is rowed by four men, the other three being employed in throwing the net; and such is the vigour exerted on these occasions, that the great body of net, rope, corks, and lead is thrown into the sea in five minutes. The sean at first forms a curved line across the course of the fish, and while the two large boats are employed in warping the ends together, the lurker's station is in the opening, where, by beating the water, the fish are kept away from the only place of escape.

When the seine is closed, and the ends are laced together, if the body of the fish be great and the sea be strong, the net is secured by heavy grapnels, which are attached to the head ropes by hawsers. It is thus not more difficult to take 1,000 hogsheads than it is to take a single hogshead.

When the evening has closed in, and the tide is low, they proceed to take up the fish. For this purpose, leaving the stop sean untouched, the volyer passes within it, and lays the *tuck* sean round it on the inner side. The tuck sean is then drawn together, so as gradually to contract the limits of the fish and raise them from the bottom. When disturbed they become exceedingly agitated, and so great is the force derived from their numbers and fear, that the utmost caution is used lest the net should either sink or burst. While the tuck sean is thus gradually contracting, and the boats surround it, stones suspended from ropes are repeatedly plunged into the water at that part where escape alone is practicable, until the fish *then* to be taken up are supported in the hollow or bunt of the sean. When the fish are brought to the surface, the voices of the men are lost in the noise made by the fish as they leave the water. The seaners fix themselves in pairs on the gunwales of the boats, with baskets, to lade the fish on board. When the quantity enclosed in the stop sean is large, the tuck sean is made to enclose no more than the boats can carry. The whole can thus be salted in proper condition, without fatigue or expense; thus a week may elapse, possibly, before the whole of the capture is secured, part being taken up every night.

Many years ago, the capital directly invested in the pilchard fishery was estimated at nearly half a million of money. The outfit of a sean amounts to £800. A string of drift nets will cost £6 a net, and the boat from £100 to £150. The boats are worked on shares; the produce being divided into eight parts—the boat has one, the nets three, the men four. An instance has been known of 40,000 hogsheads being taken into port in one day. About 3,500 pilchards go to a hogshead; and thus twenty-five millions of living creatures have been drawn at once from the ocean for human sustenance.

Pilchards are chiefly exported. The great market for them being the Roman Catholic countries around the Mediterranean, and Spain. The average number of hogsheads exported is about twenty-five thousand or rather more, or from eighty to ninety millions of fish.

The fish remain in salt for five or six weeks, during which a quantity of oil, salt, and water drains from them into wells cut in the centre of the stone floor on which they are laid. The oil sells for a considerable sum, and the refuse forms good manure, so that nothing is lost.

Sprats and Eels.

As regards the sprat—insignificant fish as it is—yet it has given rise to at least one proverb, and it puts about £100,000 a year into the pockets of the London dealers. Almost incredible numbers are consumed yearly by the poor of London. It is chiefly caught on the Essex coast; and the mode of fishing is peculiar—called stow boat fishing. A dish of sprats, I believe, is always put on the table at the annual feast in the Guildhall London on Lord Mayor's Day, which is the orthodox period for the opening of the sprat season.

I have never seen the Stow Boat Net, but Mr. Yarrell describes it as having "two horizontal beams: the lower one, 22 feet long, is suspended a few feet above the ground; the upper one, a foot shorter in length, is suspended about six fathoms (36 feet) above the lower one. To these two beams, or balks, as they are called, a large bag net is fixed, towards the end of which, called the hose, the mesh is fine enough to stop very small fry The mouth of the net, twenty-two feet wide and thirty-six feet high, is kept square by hanging it to a Cable and heavy Anchor at the four ends of the beams. The net is set under the boats bottom; and a rope from each end of the upper beam, brought up over each bow of the boat, raises and sustains the beam, and keeps the mouth of the net always open, and so moored that *the tide carries everything into it.* A strong rope, which runs through an iron ring at the middle of the upper beam, and is made fast to the lower beam, brings both beams parallel, thus closing the mouth of the net when it is required to be raised."

The system of stow boat fishing is a most destructive one, and altogether prohibited in France. In favourable seasons enormous quantities of sprats are sold for manure. Forty

bushels of sprats are considered a good dressing for an acre of land. About 400 to 500 boats are said to be engaged in this fishing.

Soles, Turbot, Plaice, &c.

We now come to the soles, turbots, plaice, skate, and other like fish. These, though they can be, and *are* all caught by hook and line, are yet more generally taken by the trawl. Some idea of the value of this fishery may be obtained from the fact that the estimated quantity of soles sold in Billingsgate is one hundred millions a year; and of plaice thirty-five millions are disposed of. This brings us at once to the much-vexed question of trawling, and its effects, which is just now creating so much stir up and down the north-east coast.

It would seem that no history of trawl fishing exists, and it would only be by a diligent search into the records of the custom house that any facts relative to the steps by which it has attained its present importance could really be arrived at. There seems, however, to be no doubt at all that Devonshire was its birth-place, and that Brixham was the first port from which a trawler set forth. Mr. Jonathan Couch, the well-known naturalist, informs me than he was well acquainted with a man who belonged to the coastguard, and who had served an apprenticeship on board a trawl vessel belonging to Plymouth, at the latter part of last century. At that time, there were only three such vessels belonging to that port—the burden of each twenty-five tons—and they were without a deck. Now, the average tonnage is at least double that amount, and the number belonging to Plymouth is sixty-four. Mr. Walker Smith, who was for sixty years a fisherman at Brixham, stated, some thirty years since, that when he first went to sea, in 1773, there were but seven fishing vessels at Brixham. As far as I have been able to ascertain, there are now between 200 and 300 trawling vessels marked and numbered out of that port, ranging from twenty to forty-five tons, all cutter-rigged. They are called sloops, carvel built, and all exclusively beam trawlers. Each vessel has three men and a boy, or four men and a boy, when they go to Hull. There are,

besides, some boats of about ten or twelve tons each, engaged in the hook and line fishing; and also three boats, which fish with seine nets. Twenty years ago, there were far more line fishers, and the number is still diminishing. These are also engaged, during the herring season, in the drift net fishing. They vary in size from four to fifteen tons. The smaller class are called yawls. The trawlers never work in the bay unless it should be blowing a gale of wind outside, and only rarely during the fence months under any circumstances. They generally trawl in the offing between Start Point and Hope's Nose, about five miles from the entrance to the bay, sometimes in thirty fathoms; but they vary their ground according to the state of the weather. With strong westerly winds the fish lie off in deep water. It is a mode of fishing peculiarly exposed to casualties. A sloop will sometimes lose her whole gear, to the value of £40 and upwards. The laws relating to fence months are not well understood but they seldom trawl in the bays as the ground is only fit in the centre, being foul all along shore on both sides. The French boats from Dieppe and Bordeaux often come in during the winter. They do not fish within the limits prescribed by the Convention Act, but purchase skate, which is taken in very large quantities, but no other fish. They are always well received, as good customers for a kind of fish otherwise very unsaleable.

The owners of sloops have a large club room at the George Inn; they elect a president and other officers. The chief object of the society is to make provision for the payment of a certain sum of money to any member who may be so unfortunate as to lose his vessel. The terms of membership require an annual inspection of the boat, and a certificate of its seaworthiness and proper equipment. The Brixham vessels are not only increasing in numbers, but their size and general style of equipment is improving also. The vessels are generally built of oak and English elm, copper fastened below the water line, and with galvanised iron fastenings above. The average price of a good Brixham trawler is about £700. There is a public establishment on one of the quays for the preparation of the material for barking sails. A composition of bark boiled with a small quantity of tallow,

some red or yellow ochre, and a ladleful of Stockholm tar to give it consistency, is what is used to bark the sails. The sail is spread out on the dry pavement, and the mixture is worked in with mops made of canvas pieces. They use only bark and Stockholm tar with their nets, rejecting altogether the use of catechu, so extensively employed elsewhere. About November, it is usual for a large number of the boats, twenty or more, to proceed to Hull and Ramsgate, and to Tenby, about May. Only the better class of boats proceed on North Sea voyages. When they go the fishermen regularly break up their establishments, and take their families with them, shutting up their houses while away. Most of the boats belong to wealthy owners on shore. The fish taken is divided into seven shares. The Skipper or master has a share and a quarter; each man, one share; and the remainder belongs to the owner, who has to pay the boy (if not an apprentice), and to find food for him. The men find their own food. The owner pays all damages to vessel, gear, &c. The ordinary wear and tear of a boat and gear, without allowing for casualties, may be set down at £100 a year or thereabouts. It is the custom for the boats to come into the harbour on Friday afternoon, and to remain until Monday morning; the Saturday being devoted to repairs and preparation for the following week.

There are old laws about fence months and limits, but they are not much remembered. Lord Vernon (who then lived at Churston), some forty or fifty years since, was anxious to revive these old laws, but without much success. The people have fallen into the old ways, "Governed only by the common law of the land against doing injury one to another, and by the law of conscience and of God; but their conviction is, the more trawling the more fish. They see no diminution in the supply though the number of takers is daily increasing. It is like ploughing the ground the small worms are raised up, and then come the shoals of fish after them."

The law regulating trawl fishing (13th and 14th, Charles II., cap. 28; 3rd James I., cap. 12) would exclude all trawlers, from May to November, from fishing within a line drawn

three miles outside Hope's Nose and Berry Head. The Brixham fish market is a covered space adjacent to the pier. As the boats drop in, the fish is brought in in large and small open baskets, which are laid upon the ground, under the direction of the women, who are said strictly to maintain the character popularly ascribed to fishwives in general. The average value of the fish sold on a well supplied market day may be, at a guess, £250. The fish is sent off by railway, chiefly to Bristol, and along the Great Western Railway to London, and other large towns along the line.

The practice of fishing with seine nets, or rather drag nets, is also common in Torbay and the neighbourhood. This would seem to be a very destructive system indeed. The net is carried out to sea for a mile or more, and then drawn ashore. By this means, enormous quantities of young fish are taken, fit only for the purposes of manure. They are often left on the shore till it is convenient to remove them, greatly to the annoyance of those whose avocations may take them into the locality of the heap.

A great deal of discussion has taken place lately about trawling for herring in Scotland. I may here remark that what is called trawling in Scotland is simply the process of fishing with an inshore seine or drag net, quite different from the system I am about to attempt a description of. As usual, there is something to be said on both sides, and it may be as well that I should give the trawler's side first, and as completely as I can. The Rev. J. R. Nankivell, a gentleman whose whole time is spent among the Brixham fishermen, and who has kindly furnished me with the most valuable information, after a close enquiry, made on purpose, it gives as the "decided opinion of the Brixham trawlers that the deep sea fishery at Brixham is quite as productive as it was twenty years ago, in fact that the yield per man is, if anything, greater. That a very inconsiderable quantity of spawn is injured by the trawl, for it is never hauled in with the trawl; and the fishermen consider that most of the fish go into shallow water, rivers, bays, &c., to spawn, where there is no trawling. That the fish when taken out of the

trawl is in excellent condition; and it is the opinion of every fisherman that fish taken out of the trawl will keep longer than fish caugh with the hook. That, as a rule, perhaps about one-eighth part of the fish caught by the trawl are worthless. No fish taken on the Brixham ground is obliged to be gutted at once, for they are brought to market very speedily, and indeed gutted fish would not be so marketable."

Mr. Andrews, president of the Natural History Society of Dublin, thoroughly advocates trawling. He has long shewn an interest in Irish fisheries. I have looked through most of his valuable papers on the fishery question; but, though strongly advocating trawling, there is little I can quote, as the information is so diffuse. In answer to the objection that the trawl destorys the spawn, he quotes a complaint made by some fishermen near Galway. The Rev. A. Synge had been trawling with a vessel of forty tons, and had sent quantities of fish to the Dublin market. The substance which the fishermen said was spawn was taken up in quantities in the net, and resembled the droppings of a cow. Mr. Andrews subsequently obtained specimens of this substance, which proved to be a sponge—*halichondria* or *cliona celata* of Johnston. It is a deep water species. Again, in another place in Mr. Andrews' pamphlet, I read, "There are nineteen Claddagh boats at present engaged in trawling in Galway Bay. Large takes of fish are invariably obtained. Even three boats following immediately in the same track have been known to fill their nets. In point of fact, the supply of fish seems to increase rather than diminish in proportion to the number of trawlers who are employed."

Professor Allman who was deputated by the Commissioners on Scotch trawling, to inquire into the subject of the injury done by regular trawlers, such as I am now speaking of, gives it as his decided opinion, that the vitality of spawn is in no way injured by the act of detatching it from the spawning beds, so that if it be removed to the sea before it suffers any prolonged exposure to the air, development will proceed apparently unchecked. I may here remark that there is no question as to the great quantity of fish taken by trawlers when first they begin to work in any part.

From the superintendent of Mercantile Marine, Ramsgate, I have the following:—"Trawling is almost exclusively practised here, and the present production of fish is quite equal to what it formerly was. The condition of the fish when taken out of the trawl is always good, except when it blows a gale, or when wreck or stone gets into the net. No other known means could give the supply of fish the markets demand, except trawling; no, not the fiftieth part." This is about all I have been able to gather on the trawler's side of the question, though I have searched and enquired diligently. There is very great jealously on the part of the trawling interest, as to any evidence about their proceedings being made public.

As regards the other side of the question, I have much, and, as I think, important evidence. Mr. Jonathan Couch writes me:—"Since the practice of trawling has been introduced into this locality (Cornwall), it is the expressed belief of the fishermen that the produce of the fisheries has greatly fallen off. The destruction of the spawn, spawning ground, and the food of young fish, is well-known; but precise evidence of this could scarcely be obtained, as all this mess is swept overboard at sea; and as many, perhaps most, of the proprietors of trawl vessels live on shore, being sailors, sail-makers, and fish merchants—the actual fishermen may be afraid to acknowledge the truth of the case through fear of being dismissed from employment. It is well known that fish caught with a trawl are much inferior in value to such as have been taken with a line, as might be supposed, when we consider that they have been dragged along the bottom of the sea for several miles amidst a mass of rubbish. Their fins thus become torn and their bodies bruised, so as to become putrid long before such as are caught in any other way. I have seen sur mullets caught in a trawl that, for a time, I could hardly tell what sort of fish they were. It is my opinion that much of the injury inflicted may be obviated by only limiting the time when the trawl may be employed; that time being when the more valuable kinds of fish are engaged in spawning, and at other times they should not come within a given distance of land. I have heard it remarked, by those who are well acquainted with

the subject, that the practice of trawling is as adverse to its own prosperity as to the fishing by hook and line, since, for one fish carried to market, many hundreds are destroyed; so that trawling itself must end at last by its own acts. But this is poor consolation to the public, who, now that the railroad could convey them rapidly and cheaply, might be supplied abundantly, if fish were as abundant as formerly."

Mr. J. G. Williamson, of Billingsgate, writes:—"I believe that the destruction of small fish and spawn by the trawl is one of the causes of the scarcity of fish as regards our own coasts the trawl retaining so much of the smaller fish as it does. . . . I am sure that if any one understanding fisheries were to see the small soles and other small fish sold in Billingsgate market, and which is often disposed of for less than it cost for carriage, would soon come to the conclusion that something ought to be done. I believe, if the wholesale destruction of small fish that now takes place is continued, that in the course of a few years the fisheries on our coast will suffer very materially."

An extensive wholesale firm of Billingsgate report that "the fish caught by trawling is not either so good in quality or condition as that caught by hook or floating nets." The Rev. J. Wilcox, of Fowey, in Cornwall, states that "the destruction caused by the trawl is most terrible to contemplate. The trawl sweeps everything before it. The destruction of spawn is immense."

I now come to the evidence of a man who was himself the captain of a trawler. He stated to me that "when the trawl is pulled up, such fish as haddocks are found to be completely scaled. They are obliged to be gutted at once, otherwise, owing to the bursting of the gall bladder, they would become quite black or green, and be utterly unsaleable. Dividing a haul of the trawl into three parts, one part would be fit for food; another would be quite small and immature fish; while the third would be utterly useless. He has sometimes thrown overboard as many as 7,000 or 8,000 fish at once. As to spawn, on one occasion while he had three tons of spawn, as he estimated by the weight of the trawl, in his net, he had only, besides

some crabs, a dozen flat fish. He considers that a single trawl destroys hundreds of tons of spawn yearly."

Another man who, for the last thirteen years, has regularly worked in a North Sea trawler, gave me the following evidence:—"When the trawl is hauled on board,the pockets will be full of soles, and a few haddocks—perhaps a turbot or two. Spawn will hang around the ground rope, stick outside the net, and drop out of it as it is pulled up from the sea, and the water drains out. The bag, or cod end, will contain all sorts of fish—shells, spawn, sea anemones, occasionally the dead body of a man, portions of bodies, some dead and stinking fish, which have been killed by other trawl nets previously passing over the ground. Fish, such as haddocks, gurnets, &c., with their backs injured, their fins gone, their eyes out—plaice with their spots rubbed off. The larger the take, the more damaged the fish. He has sometimes thrown overboard as many as seven or eight baskets of fish after one haul—five or six hundred fish in a basket—some alive, some dead, some dying. At other times, there have been so many small and worthless fish that the bulwarks have had to be unshipped, and they have been swept overboard with brooms. Trawlers always gut turbots, soles, haddocks, and, in the summer time, plaice." He stated that the fishing grounds in the North Sea are gradually becoming poorer. That the Silver Pits, near the Dogger Bank, one of the most prolific grounds in the English waters, do not produce one-third of the quantity they once did. Some grounds are altogether exhausted by the trawlers. Again, Mr. Dawson Campbell, of Folkestone, writes me:—"When trawling near shore in spawning time, quantities of spawn are brought up by the trawl, and also large numbers of small fish, and these remain in the boats till the net is cleaned, when, of course, the greater part of them are dead. All fish, except flat fish, are very much disfigured by the meshes of the trawl; in fact, during the whiting season, these caught by the trawl do not fetch nearly the price that whiting caught by the hook and line do."

As regards the number of trawlers generally at work, it is

impossible to obtain accurate information; but I believe that from 900 to 1,000 will rather be below the mark. I have heard of 800 being seen at one time at work off the Dutch coast, but many of these, perhaps most, were only small Dutch boats. The mode of working the trawl vessels varies. The Hull boats are worked on the joint-stock principle, the owners sailing in them and working them. The Barking (or Thames) vessels are the property of a few wealthy owners, and the men are paid regular wages. They remain out at sea for eight weeks at a time; a Yarmouth smack six weeks. The cost of a Barking trawler, complete for sea, is from £800 to £1,000. The cost of the cutters which attend the fleet is from £1,000 to £1,500, and the expense of working such vessels is from £50 to £60 per month. The Barking trawlers are worked on a most systematic plan. The two largest owners of trawling smacks—Messrs. Hewitt and Morgan—have a commander-in-chief for their respective vessels, who is known as the admiral, and the proceedings of all the other smacks belonging to other owners are also regulated by the movements of these two admirals. The pay of a captain of a Barking smack is 14s. a week, and 5 per cent. on the value of the fish sold in Billingsgate from his smack. The mate gets 19s. a week, and the men's wages vary from 14s. to 18s. a week. The owners find provisions and everything. The apprentices get what they can. A Barking smack carries a captain, three men, and four apprentices.

I find that it is stated, on what seems to be very good authority, that there are on the east coast of England, from London northwards, 17,000 fishing vessels of all sorts and descriptions, with an aggregate tonnage of more than 75,000 tons.

As regards the productiveness of the various fishing grounds, the matter may be summed up in a very few words: everywhere, save from the deep sea fishing grounds off Brixham and from Dover, the report is that it is failing. From the Lancashire coast the report is that the fry are much killed; the injury inflicted by the shrimp fishermen of Poulton, by destroying the small fry of soles, turbot, flukes, and plaice, is said to be terrible. The oyster fisheries are also suffering, and the demand increases

as the supply diminishes. At Milford Haven, this has been so much felt that the common fishermen have requested official interference. At Carmarthen, the report is, "about twelve years ago, the trawlers were able to catch fifteen or sixteen baskets of fish at a haul. Now they have very little success. The decrease is attributed to the inshore seines. From Tenby, the report is that the fish is not nearly so plentiful as formerly. The Bridgewater Bay Fisheries are said to have been almost destroyed by the hose nets. From the Cornish coast, that fishing is much less productive than formerly. A man who, forty years ago, could support his family decently by fishing with hook and line, varied by nets for pilchards, mackerel, and perhaps herring, is at this time but little removed from poverty. The capital barely repays itself by the time it has been worn out in the service. Devonshire coast:—Deep sea fishing as productive as ever, but in bays and shallow waters the fish is very scarce, and the supply much diminished of late years, Formerly, there used to be a great quantity of dabs, flounders, and other flat fish, which have now almost entirely disappeared. The decrease is attributed to the increasing use of in-shore seines. On some parts of this coast, hundreds of waggon loads of small fish—soles, cod, whiting, and turbot—are taken in the year, and bushels on bushels are thrown away with the weed to die. The Dorsetshire coast:—The report is that the fishing is not nearly so productive as formerly. From the Sussex coast:—That the fishing is greatly reduced. Brighton, once a fishing village, is now almost supplied from London. From the Kentish coast, I learn that fish, especially turbot, brill, and plaice, are much more scarce than formerly; but the Dover trawlers declare that the fishing there is about the same as in former years. From the Essex, Suffolk, and Norfolk coasts, complaints are made of the fearful destruction of fish of all kinds by the system of stow boat fishing, and that a great quantity of fish is annually sold for manure; and off the Norfolk coast the fishery is said to be less productive than formerly by 50 per cent. The Lincolnshire report speaks of great damage done by improper modes of fishing—especially with the trawl—and gives a striking example of the good arising from a

little regulation in the mode of fishing, in the fact that the mussel fishing was nearly extinct before the Corporation of Boston took the subject up four years since; but that since then it has so improved that ten tons a day are sent off to Manchester and the fishing is worth at least £60 a week to the men. Great quantities are also sent away by sea, and sold for bait to the fishermen along the Durham and Northumberland coasts. But the Corporation of Boston have recently been set at defiance, and the law has proved too weak, and so the old state of affairs is likely very soon to return. From the Durham coast the reports place the decrease in supply at from fifty to thirty per cent.; from Cullercoats, that the average now is about fifteen stones per boat. Years bygone it was nearly seven times as great. When a boat was entering the harbour it was then the custom to hold up the hand. If held up once it signified that one cart would be wanted to convey the fish away. If twice, two carts, and so on. Twenty years ago, any one could have gone down to the shore and had their choice of the best cod for fourpence each; the fishermen then getting from forty to sixty each This winter (1862-3), for days together, there has not been a cod amongst all the boats. Far less fish sent to the south than formerly. Blyth, Holy Island, and the other fishing stations, all report to the same effect.

I am not aware of the number of boats engaged on the Durham coast, but it approaches one hundred. On the Northumberland coast there are one hundred and fifty-five engaged in the white fishing, of which thirty-eight belong to Cullercoats, twenty-seven to Newbiggen, and sixteen to Holy Island. And in addition there are probably about one hundred exclusively employed in the herring fishery.

It requires four men, or three men and a boy, to work a north country open fishing boat for white fish. The quantity of lines carried by the boats varies at the different villages. At Cullercoats, each man in the boat has eight pieces of line, each sixty-eight fathoms long, and the number of hooks is from 900 to 1,000. Each hook requires at least two mussels to bait it.

My paper has run to a very far greater length than I ever ima-

gined it would when I began, but, as I have gone along, paragraph after paragraph has been struck out in order to lessen its inordinate length. A vast field of information remains unexplored, and I hope that one result of the discussion of this subject will be to draw forth very much valuable information, and to lead others to investigate closely this very intesting and important department of natural history, and, I may say, social economy; and I think there cannot now be the smallest doubt that the subject demands immediate investigation from the Government or the Legislature; and I do hope that the way will soon be found to be quite clear for the issue of a Royal Commission. The enquiries by a select committee of the House of Commons are very expensive, and, necessarily, very limited, and would in this case be peculiarly barren and unsatisfactory, owing to the character of the persons from whom information must be sought. English fishermen are a peculiar race, and very little inclined to be communicative save to those whom they know and who have their confidence.

There is just one hint which I would throw out. Why should not the artificial breeding of sea fish be attempted? The experiment would be far from a costly one, and the results might be most profitable. The recent experiments with regard to salmon are most encouraging, and that most interesting display, which has been seen in the *Field* newspaper window in London, is one which certainly tempts one to say "Go on; try sea fish as well." It is known that cod and haddock will live and thrive in ponds. I commend this idea to the members of the Tyneside Naturalists' Club.

VII.—*Miscellaneous Notices and Observations.*

Note on Stellaria Friesiana.—In the Herbarium of the late Mr. Borrer, now at Kew, is a very small fragment of a *Stellaria* labelled '"Stellaria Friesiana." (Sandy shore of the Tyne, at Ridley Hall?) sent by Mr. R. B. Bowman to Mr. Babington, among *Arenaria verna*.' This scrap may be *S. Friesiana* (=*S. longifolia*, Fries.) or perhaps starved *S. graminea*,

Indeed I doubt if *S. longifolia* be specifically distinct from *S. graminea*. However this may be it would be very well, should any botanist be up Tynedale, that attention should be directed to any such *Stellaria* growing by the river side. Mr. Bowman's specimen has probably been entangled in a tuft of *Arenaria*. *S. longifolia* differs from *S. graminea* in having the upper branches and the edges and keel of the leaves scabrous more or less.—*Professor Oliver*, 16 *Feb.*, 1863.

Curious instance of tenacity of life in a Cockchafer.—When in Cumberland lately, I had brought to me a cockchafer (*Melolantha vulgaris*) which was mutilated in a most extraordinary manner. The scutellum, elytra, wings, upper half of abdomen, the whole of the viscera, and the contents of the mesothorax and metathorax were gone; yet with the exception of the hind pair of legs, which the insect could not move, the poor creature was as active as if unhurt. Moreover it had apparently been for some days in this state, the interior of the abdomen, and other parts being quite dry and smooth. Shut up in a tin box, more than twenty-four hours elapsed before life became extinct.—*T. J. Bold, Long Benton, July* 1, 1863.

Capture of a new British Beetle, near South Shields.—I took, beneath stones on the sea shore, near South Shields, on the third of April last, three specimens of *Bembidium* (*Tachys*) *Fockii*, Hummell, an insect new to the English fauna. It is a beautiful little creature of active habits, and at first sight looks like a very lively specimen of *Lathridius lardarius*. Dr. Schaum records it as occurring at Baden, in the Tyrol, South of Europe, Crimea, Caucasus, Algiers and Syria, and Mr. Wollaston found it in Madiera; a wide range for so small a creature.—*Ibid, May* 20, 1863.

Note on Bledius arenarius.—In the early part of this month I fell in with a colony of *Bledius arenarius*, Payk, and in its burrows found several specimens of *Dyschirius thoracicus*, Fab. The colony was established in a damp sloping sand bank, on the sea coast near Whitley. The shallow burrowing of the insect had raised the sand in irregular lines, which becoming dry, gave the whole the appearance of miniature mole runs, the resem-

blance to which was heightened by little hillocks of sand at the opening where the Bledius had entered. All the specimens taken, except one, had the usual pale elytra, whilst a long series of the same insect taken by myself at Tain in Rossshire, have their elytra, without exception, dark coloured, with only the margins pale. In the Entomological Magazine, Vol. 2. p. 180, is an interesting notice by the Rev. G. T. Rudd, of his having found the same insect in immense profusion on the Yorkshire side of the estuary of the Tees. He observed them to burrow in the sand, in situations where they were covered by the sea, and after the turn of the tide he dug them out unharmed by their submersion. He also noticed a large Dyschirius in their burrows, whose object there seemed to be to prey upon the owners, which it seized, shook as a terrier does a rat, and then devoured. At Tain, also, the Bledius was found within tide marks, so that the locality at Whitley would appear to be a departure from its usual habit.—*Ibid*, *May* 20, 1863.

Note on Fleas at the sea-side.—It is rather curious to find fleas on such unlikely places as the sands, nevertheless they are far from scarce amongst the dry sand at the foot of the sea banks. I saw them dancing about quite merrily, between Hartley and Whitley, and at other times they have been noticed quite frequently from South Shields to Marsden. What they can find to feed upon in such places is rather difficult to say, perhaps mice, and other small mammalia may share their attention; at any rate they are well fed, for all that I have caught were fat and active.—*Ibid*, *May* 20, 1863.

Capture of Mycetoporus nanus, a beetle new to the British fauna, near Hartley.—Truly "it is an ill wind that blows nobody good." The terrific gales which we had in April, although they prevented me collecting elsewhere, still yielded a harvest after their own fashion, for they carried everything of insect kind along with them, depositing them in sheltered nooks, or in depressions on the sand; and out of such places near Hartley, I took, amongst many other things not commonly met with, four specimens of *Mycetoporus nanus*, Grav., a very desirable addition to the British fauna.—*Ibid*, *May* 26, 1863.

Note on an Acarus.—During the prevalence of the windy weather of which we have had so much this spring, I found the most productive localities for insects to be the depressions in the dry sand, on the sea coast, and in these I have found several novelties for our fauna. These were somewhat difficult to find from the immense accumulation of a minute yellowish brown *Acarus*, which swarmed on every thing, in and near the holes. Every insect, however minute, had as many passengers as ever he could stagger under, and woe betide him if he lost his feet, for the *acari* immediately swarmed in such numbers to his legs that never would he rise again. An attempt to fly was equally disastrous, for neither could the beetles close their elytra, or fold their wings, from the numbers of their active enemy. I saw flies, and good sized ones too, so completely covered as to appear like a spikelet of dried clover; body, legs, and wings being so invested that the poor creatures would find relief only in death. When disturbed the *acari* left the insects in alarm. Depressions in the sand appeared as if filled with rusty sediment from their numbers. I am unacquainted with the specific name of the *acarus*, but it is not the species which affects *Geotrupus* and others, but a very much smaller one.—*Ibid*, *May* 20, 1863.

Desmidiæ, &c., on the Northumberland Moors.—The peat-bogs in the neighbourhood of the Northumberland lakes are peculiarly rich in algæ, especially the 'unicellular' forms. In September, 1861, I gathered there many different species of Desmids, viz:—*Closterium Dianæ*, *striolatum*, *moniliferum*, *didymoticum*, *Cornu*, *Griffithii*, *costatum*, *lanceolatum*; *Tetnemorus granulatus* and *Brebissonii*, *Micrasterias denticulata*, and *rotata*; *Euastrum didelta*, *cr*ucosum*, *oblongum*; *Staurastrum muricatum*, *orbiculare*, *cuspividatum*, *paradoxum*; *Penium interruptum*, and *margaritaceum*; *Docidium truncatum* and *clavatum*; *Gonatozygon Ralfsii* (?), *Cosmarium margaritaceum* and *Didymoprium Borreri*. Among the more interesting of the higher algæ were *Zygogonium ericetorum*, *Bulbochæte setigera*, and *Draparnaldia cruciata*, Hicks.—*George S. Brady.*

VIII.—*Notes on Plants collected during the Meeting of the British Association*, 1863. By J. G. Baker.

In his account of the distribution through Britain of the Brambles, which is published in the third volume of Watson's "Cybele Britannica," Professor Babington remarks that the Rubi of the Tyne province, which includes the two counties of Northumberland and Durham, are almost entirely unknown and unrecorded. I have never had, until the present year, a good opportunity of studying them, and even now my observations have been restricted to a very few localities; but having this autumn stayed for a fortnight in Northumberland, for the purpose of attending the meeting of the British Association, I took the opportunity of gathering specimens of all the forms I saw, and now venture to lay an account of them before you, along with a few other notes which relate to the botany of the two counties.

Ranunculus trichophyllus (Chaix). In plenty in a pond on the top of the cliff by the side of the foot-road, between South Shields and Marsden. This is very rare in North Yorkshire, but we have an allied plant in plenty, the *R. Drouetii* of Schultz.

Fumaria Borœi (Jordan). Hedgebank at Preston, near North Shields. To this species the Rev. A. M. Norman's Embleton *Fumaria* must also be referred, and it is the only Capreolate Fumitory I have at present seen from the two counties.

Sinapis muralis β *Babingtonii* (Syme). Plentiful on ballast at Seaton Sluice.

Silene puberula (Jordan). Hedgebank, between Earsdon and Preston, Northumberland. I think not safely to be separated from *S. inflata*.

Arenaria leptoclados (Guss). Of this W. H. Brown and I gathered very characteristic specimens on Hartley Links. Scarcely separable from *A. serpyllifolia*.

Rubus.

1. Rhamnifolii Stems shining, glabrous, or nearly so, the prickles equal, and almost confined to their angles.

1. *R. rhamnifolius* (W. & N.) The large cordate-leaved form, in excellent condition, in a lane between Bardon Mill and Chesterholme. A less robust and more ovate-leaved form on Whitley Links; and what is probably a microphyllus variety of this species near Bardon Mill.

2. Discolores. Stems with closely adpressed pubescence, the prickles equal, and almost confined to their angles.

2. *R. discolor* (W. & N.) Hartley Links. In North Yorkshire the commonest thicket species, usually to be readily recognised by the shining green upper and white felted under surface of its leaves.

3. Sylvatici. Stems with spreading hairs, the prickles nearly equal.

3. *R. leucostachys* (Smith). With the preceding on the links north of Seaton Sluice.

4. *R. villicaulis* (Weihe). Hedge of a lane between Bardon Mill and Chesterholme. A rare species in the north, and not known to me as occurring in North Yorkshire.

5. *R. umbrosus* (Arrh); *R. carpinifolius* (Bloxam). Whitley Links, hedges near Bardon Mill and Seaton Delaval, thickets in Holywell Dene, &c. Now placed by Professor Babington under *R. macrophyllus*.

4. Radulæ. Prickles nearly equal, stems setose and aciculate.

6. *R. rudis* (Weihe). In good condition with *R. Koehleri*, in thickets, at the lower part of Holywell Dene.

7. *R. Radula* (Weihe). Thickets in the Seaton Delaval Avenue; hedges near the Hartley Junction Station.

5. Koehleriani. Prickles abundant, very unequal, passing by gradual stages into aciculi and setæ.

8. *R. Koehleri* (Weihe). Abundant in Holywell Dene, hedges near Bardon Mill, &c., &c. The variety *pallidus*, in the shaded parts of Holywell Dene. The common woodland bramble of North Yorkshire. An allied plant, with equally prickly stems; leaves strongly veined beneath, but seldom quinate, and then the basal pair sessile and imbricated, with a fastigiate level-topped panicle, and sepals adpressed to or loosely

reflexed from the fruit, forms extensive thickets on the links north of Whitley.

7. *R. diversifolius* (Linl). Thickets in the ravine of the Bardon Burn, below Chesterholme.

6. Cæsii. Stems slightly angular, usually bloomy, with scattered unequal prickles, and few or no setæ and aciculi.

10. *R. corylifolius* (Smith.) Hedges near Whitley, Seaton Delaval, Bardon Mill, &c., &c. In Yorkshire the common hedgerow bramble of the low country.

11. *R. cæsius* (L). Hartley Links, &c.

Rosa Sabini var. In the valuable collection of roses, made by the late Mr. Robertson, and now kept in the Newcastle Museum, there is a plant marked "*Rosa involuta*, 2nd variety, Ouseburn." The Ouseburn which is meant is, I presume, the stream of Heaton Dene, and I fear the plant is now eradicated. Like the late Mr. Winch, I do not think that *R. involuta* is fairly to be separated as a species from *R. Sabini.* There are authenticated specimens of the true *R. involuta* in the same collection, sent by Mr. Borrer, from the Cambridge Botanic Garden. The true *R. involuta* has the upper side of the leaves glabrous, the lower hairy all over, glandular principally on the edge, some of the teeth simple and some with one or two accessory gland-tipped serrations, a very prickly subglobose calyx-tube, and undivided glandular and setosociliated sepals. The Ouseburn plant comes nearer a Belgian form, the *R. subnuda* of Crepin, than anything else I have seen in England. The leaves are hardly at all hairy above, and on the underside they are hairy principally on the midrib, and but slightly ciliated along the edges. The serrations are fine and sharp, but usually double; the peduncles very prickly and setose, but the calyx tube is dark purple and glaucous, and almost entirely destitute of prickles and setæ; the leaf-pointed, glandular sepals being slightly compound, and in the specimen preserved the flowers are four in number, and the lateral peduncles are furnished with lanceolate setoso-ciliated bracts. I wish the plant could be found again.

Rosa canina, varieties. Three Northumbrian forms of this very variable plant appear to merit attention. The first was in

a thicket near Chesterholme, and had none of the fruit turned scarlet, at the date of the excursion to Crag Lough, the first week in September. The fruit of this is globose; the sepals not reflexed, but either spreading or erecto-patent, and glandular all over the back; the leaves are glaucous-green and glabrous on both sides, with connivent sometimes slightly double teeth, the petioles slightly glandular but not hairy, and the stipules somewhat setoso-ciliated. The second grows near the *Rubus rudis*, at the lower part of Holywell Dene. There by the first week in September the globose fruit had all turned scarlet, though the sepals were still mostly persistent. The sepals are copiously pinnate with toothed leafy points, erecto-patent in direction, tomentose at the sides, and copiously setoso-ciliated. The leaves are glaucous-green with open serratures, the central ones with three or four glandular teeth, glabrous above but slightly hairy on the veins beneath; the petioles tomentose and setose with hooked aciculi, the terminal leaf broadly ovate, the stipules and bracts copiously setoso-ciliated. The third grows in the hedge between Hartley Junction Station and the Seaton Delaval Avenue. Here by the first week in September the ovate fruit was mostly turned scarlet and the sepals fallen. The sepals are erecto-patent in direction and glandular all over the back; the leaves glaucous-green, especially beneath, glabrous on both sides, doubly serrated, the petioles with numerous setæ but no hairs, and the stipules setoso-ciliated.

Lepigonum neglectum (Kindb). This, the *Spergularia media* of English authors, is the only plant of the genus which I saw in the salt marshes about the mouth of the Holywell Burn and along Hartley Links. It is distinguished from *L. marinum* by its much smaller capsule, and the seeds being many or most of them without a wing.

Pastinaca sativa. The *Pastinaca* of the Ballast Hills seem to be all *P. pratensis* (Jordan), the common English form. It has the leaves dull and slightly hairy upon the upper surface, and the umbel with from eight to ten rays.

Polygonum Raii (Bab). Of this species W. H. Brown and I gathered good specimens in two or three places amongst the

Links between the village of Seaton Sluice and the mouth of Meggy's Burn, and Mr. T. J. Foggitt has just shewn me specimens from the Durham coast near Seaton Carew. It is new to the Tyne province, and Mr. Watson writes (Cybele Brit., vol. 2, p. 338), "Very few of its localities hitherto recorded are situate upon the east coast of Britain, namely, those of Forfarshire and Norfolk, both of which may be deemed to require confirmation, although not so unlikely as to warrant their rejection." Easily known from all the forms of *P. aviculare* by its large shining seeds, which are half as long again as the perianth. We also obtained characteristic examples of *P. microspermum* (Jordan), a variety of *P. aviculare*, on Hartley Links.

Ruppia maritima. The true plant plentiful in the salt marsh at the mouth of Holywell Dene, and very fine at the mouth of Meggy's Burn, near Blyth.

Juncus diffusus. Banks of the little stream not far from Bardon Mill Station, where the *Hieracium*, formerly called by Babington *rigidum* variety *pictum*, grows.

Triticum acutum (D.C.) Plentiful at St. Mary's Island, and growing also upon Hartley Links. Leaves with closely-placed rough hairy ribs, hardly at all enrolled, except quite at the apex, and the point not sharp. Axis of the spikelets smooth.

IX.—*On the Zoology of Hylton Dene.** By George S. Brady.

There is, I think, no inland spot in our district which possesses more interest for the student of the lower forms of animal life than Hylton Dene; and this not so much by reason of the abundance or excessive rarity of the species there found (though, indeed, in this latter respect it is somewhat remarkable), as on account of the curious association of what we are accustomed to regard, so to speak, as incompatible species, and the peculiar conditions under which they exist.

Hylton Dene is a ravine or dell, through which flows a streamlet—in North country phrase a *burn*—tributary to the River

* This paper was read also at the Newcastle meeting of the British Association.

Wear, which it joins about a couple of miles above Sunderland Bridge. The burn itself is, like the Wear at that point, subject to tidal influence; but the adjacent pools, of which we have more particularly to speak, are above the level of high water at spring tides, though the ground on which they lie is stated in the maps of the ordnance survey to be liable to floods, and is indeed on that account claimed by the River Wear Commissioners as coming under their jurisdiction. The pools are separated from the burn by intervening spongy ground, so that all their saline constituents must be obtained either by the agency of these very occasional floods, or by percolation through the soil taking place at the highest spring-tides. The burn has cut for itself a deep and tortuous channel, well defined, and with almost perpendicular banks, from which the ground stretches away on each side in a flat expanse for a distance of about seventy yards, until it merges in the steep sides of the dene. On this expanse (measuring altogether 150 by 350 yards) are situated several small pools, irregular in shape, but uniformly very shallow, with one exception scarcely ever exceeding, I think, about six or eight inches in depth. Zoologically, we may divide them into three groups—the *first* comprising those which lie nearest to the river Wear; the *second* including all others situated on the south of the burn; while to the *third* belongs only one deeper and larger pool, which is on the north bank of the burn.

The proportion of saline constituents in the water of the pools regularly decreases as we recede from the river, the quantities being as follows:—those of the first group contain $6\frac{1}{4}$ grains of chlorides in the fl. ounce=1·3 per cent.; second, $4\frac{1}{2}$ grains=·95 per cent.; third, ·84 grains=·176 per cent. These quantities should, however, be taken only as approximations to the truth; they must be open to considerable variation according to the amount of rainfall and the frequency of very high tides. As regards their organized inhabitants the pools differ no less conspicuously than in their inorganic constituents. I append a full list of the animals which I have found in each group, but for the present it will be sufficient to point out their most characteristic

differences. Those of the first and most saline group are marked chiefly by the presence, during the autumn months, in considerable abundance, of two nudibranchiate molluscs, *Alderia modesta* and *Limapontia depressa*. They contain also in common with the second group various crustacea, *Gammarus locusta*, *Orchestia littorea*, *Palæmon varians*, *Crangon vulgaris*, *Corophium longicorne*, *Sphæroma* (? *rugicauda*) and *Temora velox*, an Entomostracan of the order *Calanidæ*. Besides these there are two or three species of Foraminifera, and some Annelida, I think of the genus *Nereis*. The second group is characterized more by the absence of certain species which occur in the first and third, than by any inhabitants peculiar to itself, though there are one or two animals of no special interest which I have found only here. The large pool which forms our *third* division differs in nothing excepting its peculiar Crustacean fauna from an ordinary fresh water pond. It lies outside the boundary line of the Wear Commissioners, and is not therefore affected by river floods. It is of tolerable depth, but very narrow, more like a tortuous ditch than a pond; and it affords a home to numerous *Notonectæ*, Beetles, Water-rats, to a few individuals, small and stunted, of *Limnæus peregor* and to a beautiful Polyzoon—*Plumatella repens*. The Entomostraca of this pool are all purely fresh water species, such as *Cyclops quadricornis*, *Candona lucens*, and several *Cyprides*. The most interesting inhabitants are, however, some of the larger Crustacea, *Palæmon varians*, *Mysis vulgaris* and *Corophium longicorne*, all of which occur in great numbers. I know of no other instance where any of these occur in absolutely fresh water, and their association with such undoubted fresh water species as those mentioned above seems to me a matter of very great interest. It is strange to see Prawns and Shrimps gliding among the leaves of *Callitriche* and overshadowed by blossoming wild rose and whin. It is remarkable that these Crustacea seem to have undergone no deterioration from their residence in fresh water; the specimens taken there are quite as fine as those which we meet with in salt water localities, except perhaps in the case of *Corophium*, which is rather small, and of which there is an unusual preponderance of females. It is

curious also that although the marine species advance into fresh water, we do not find the fresh water species tolerate even a very small admixture of salt; for except the Stickleback, I have never noticed any fresh water animal in the saline pools. Professor T. Rupert Jones in his "Monograph of the Fossil Estheriæ," says that some of the fresh water Entomostraca "may have been capable of living, at least for considerable periods, in even salt water, for some of the common *Cyprides*, such as are abundant in fresh water streams, are not uncommon in ditches of brackish and even highly saline water in the low grounds near the sea." I must say that this is quite contrary to my experience, and at all events I do not think it can be a thing of common occurrence. I have never met with any of the fresh water Entomostraca in brackish pools, nor have I ever in such situations found any species of Cypris; the only *Ostracoda* which I have taken belonging either to the genus Cythere or to the sub-genus Cyprideis. The Corophium is found inhabiting tubular burrows on a soft muddy or peaty soil: it is always, so far as I have observed, associated with numbers of Annelids, and though it undoubtedly has the power of burrowing rapidly into the mud, I believe that the tubes in which it is found are really the work of the Annelid. And if, as it is asserted, there be such a deadly enmity between the two creatures, it is not at all an impossible circumstance that the Corophium, after demolishing the unfortunate Annelid, may add insult to the injury by taking possession of its burrow. The constant presence of Corophium in localities of this kind where no communication with the sea is possible would seem to contradict the assertion of M. Quatrefages (quoted by Spence Bate and Westwood in their History of the British Sessile-eyed Crustacea) "that at about the end of April they come from the open sea in myriads to wage war with the Annelids, which they entirely destroy before the end of May; they then attack the mollusca and fish all through the summer, and disappear in a single night about the end of October, and return again the following year."

Estuarine swamps such as this which we have just noticed seem to be the nearest analogues we now possess of those exten-

sive lagoons which, during the Carboniferous period, supported the rank vegetable growths now fossilized in our coal-measures. To the palæontologist it must be a matter of considerable interest to note the association of species in such localities, and I think enough has been said to show that considerable caution should be used in pronouncing upon the saline or fresh water nature of any deposits merely from the nature of the animal forms which they enclose. Judging from analogy, however, (if our own island may be taken as a type) we should suppose that any great luxuriance of vegetable growth must be indicative of fresh-water conditions. We uniformly find in the saline portions of these marshes a peculiarly dwarfed and stunted vegetation, while as we recede from the salt-water influence it often assumes a rank luxuriance, putting on a character quite as much in accordance with the vegetation of the coal period as can be expected in these degenerate days.

Group 1.

Alderia modesta.	Praniza sp.
Limapontia depressa.	Temora velox.
	Cythere pellucida.
Palæmon varians.	
Crangon vulgaris.	Annelida.
Orchestia littorea.	Foraminifera.
Gammarus locusta.	
Corophium longicorne.	Vaucheria velutina.
Sphæroma sp.	Oscillatoria littoralis.

Group 2.

The same as the above, omitting *Alderia* and *Limapontia*, and adding *Tachidius brevicornis* (a minute Entomostracan).

Group 3.

Limnea peregra.	Cypris monacha.
Plumatella repens.	Candona lucens.
Palæmon varians.	Notonectæ, Annelids, &c.
Mysis vulgaris.	
Corophium longicorne.	Callitriche platycarpa.
Cyclops quadricornis.	Potamogeton natans.
Cypris gibba.	Various Algæ.
Cypris aculeata.	

X.—*Notice of various recent Captures of Pallas's Sand-Grouse (Syrrhaptes paradoxus) in Northumberland and Durham.* By John Hancock.

On the 23rd of last May I received a parcel from Wm. Reay, Esq., of Thropton, near Rothbury, and was no little astonished, on opening it, to find that it contained three fine, fresh specimens of Pallas's Sand-Grouse,—two males and one female. These were shot by George Rennison, a stone mason living at Thropton, from whom I have the following account of their capture.

He was walking, he says, through a barley field at 3 o'clock on the morning of Thursday, the 21st of May, when a flock of about fourteen birds strange to him, got up, and after a short flight settled again in the same field. He went behind a hedge, and fired at the birds sitting; he killed three. The flock then rose and flew off direct west. When on the wing they uttered a note something like that of the plover. From certain signs on the ground he believed the birds had roosted during the night in the field.

Such is the account of what I believe to be the first capture of this interesting bird, out of the numerous flocks that have this year so unexpectedly visited almost every part of Great Britain.

All the three specimens were in the moult.

On the 2nd of June, a female was killed at Ryton, in a pea field, out of a flock of about sixteen.

On the 13th of June, I saw a female specimen in a game dealer's shop in Newcastle, which was picked up wounded in a field near Embleton; and about a fortnight after another individual was shot at the same place.

On the 27th of June, I received a brace from John Dinning, Esq., male and female, which were shot at Ross Links, about the 24th.

On the 30th of June, a male was shot, near Cowpen, out of a flock of about twelve. This also came into my possession.

On the 23rd of August, I had five specimens brought to me by Mr. Thomas Bates, a bird stuffer residing in Newcastle, who received them from Belford, where they had been killed. They were all females except one, and all were deeply in the moult. They were afterwards sold at a game dealer's shop in Newcastle during the meeting of the British Association in this town.

On the 26th of September, I bought a very fine female of the same dealer, and he informed me that he had just sold a male specimen. These were shot near Berwick-upon-Tweed, and had both very nearly completed their moult.

About the 5th of October, the same dealer had other three specimens, two females and one male, which were captured near Bamborough. These specimens had also nearly come through the moult. I am informed that several other specimens were taken in that neighbourhood; and also that Mr. Snowdon, gunsmith, residing in Alnwick, has either two or three which were killed near that town.

On the 24th of November, a female was brought to Mr. Proctor, of Durham. It had flown against a telegraph wire, and was found lying on the ground dead. From the state of the specimen, it was thought it must have been killed five or six days. This bird, which I had an opportunity of examining, had completed its moult, and was in fine fresh plumage.

I have lastly to record that Hutchinson, a fisherman at Whitburn, tells me that he saw, about the middle of June, two flocks of these grouse settle in the standing corn near that village.

From the above notes it appears that twenty-two or twenty-three specimens of this beautiful and rare visitant have been taken during the year in this neighbourhood, nearly all of which I have seen. Seven were males, twelve females, and of three the sex was not determined. A few other individuals have occurred near Berwick-upon-Tweed, and are not included in this number, which, though large, falls far short of the whole that have actually visited our district.

They usually appeared in flocks composed of both sexes, but did not settle for any length of time in any one locality.

All the specimens I have seen were in the moult, with the exception of that which occurred in November. They cast their feathers very gradually, as evinced by the fact, that though moulting when they first made their appearance in May, they had not completely changed all their plumage in October. The feathers are cast symmetrically, the corresponding quills of the wings falling out at the same time. Hence the flight of the bird is very little impeded, and it may be inferred that its powers of flight are maintained during the moult; probably to enable it to accomplish its extensive migrations.

The moult of the falcons is regulated in the same manner, as it is necessary that these rapacious birds should always be able to out-fly their prey. On the other hand, some birds, as for instance, many of the ducks, cannot fly at all during the period of moult, which however, in such cases is always very rapid.

All the specimens that have come through my hands, were mature, as proved by the state of their bones as well as by the plumage. They were in good condition and weighed pretty uniformly half a pound each.

The reproductive organs, in both sexes, were in a low state of development in all that I have examined. From this we may infer that the breeding season had passed before the birds reached this country. This might likewise be assumed from the fact that they appeared and continued in flocks from the first till the last, and from their being in the moult, which usually commences after the breeding season is over.

My friend Mr. Alfred Newton, has reminded me that some of the grouse continue shedding their feathers throughout the whole of the breeding season. This is certainly the case; but this moult which precedes and is frequently continued into the breeding season, is only the partial spring or nuptial moult, during which neither the quills nor tail feathers are changed. The general moult does not commence even in the grouse, or in any of those birds which acquire a nuptial dress, until the breeding time has passed. The sand-grouse has apparently no nuptial plumage, consequently no spring moult. And it is quite certain that when these birds arrived, in such numbers, on

our shores, that they had commenced the general moult, for the quills in both the wings and tail were being shed.

Much has been said and written on the possibility of this interesting visitant becoming naturalized in the British Islands, had it been allowed to remain undisturbed. It is, however, very doubtful whether our moist climate would have suited the habits and organization of a bird fitted for residing in the arid plains of Asia. At the same time it is much to be lamented that it should have been so mercilessly shot down wherever it has appeared, precluding the possibility of its continued sojourn with us.

It is an excellent bird for the table, resembling much in flavour our common grouse. It is, therefore, not likely to be permitted to settle unmolested in our thickly populated country, unless it should find shelter in some of our strict preserves, where it might rest for a while; but its migratory propensities would soon compel it to quit any such narrow asylum.

In concluding this short communication it may be stated that Mr. Thos. J. Moore in his interesting account of this "new British sand-grouse," published in the October part of "The Intellectual Observer," is wrong in asserting that "the female differs from the male in wanting the filament of the wing." In all the females I have seen, this filament, as well as that of the tail is present. In one specimen in my possession the wing filaments indeed, are not visible until the wings are carefully examined; owing to the fact that the first quill has not yet attained its full length, and the second, which appears at first sight to take its place, covers it. The filamentous quill, however, is easily observed in a half-grown state with the filament of the usual length—that is, a little shorter than it is in the male. It is probable that Mr. Moore has been deceived by a specimen in this state, or perhaps the filamentous quill may have just fallen out in the individuals he examined, and the new one may not have made its appearance. Under such circumstances the second quill, which has no filament, might easily be mistaken for the first.

XI.—*On Species of Ostracoda new to Britain.** By George S. Brady.

[Plates II. & III.]

The following species of freshwater Entomostraca have been taken during the present year (1863) in the counties of Northumberland and Durham. One of them (*Cypris affinis*) is a Continental species, not heretofore recorded as a native of Britain. The rest are now for the first time described. To these descriptions I have appended a few notes on the animal of *Cyprideis torosa* (Jones), and on its occurrence in a recent state in this district.

Family **Cypridæ.**

Subfam. 1. CYPRINÆ, *Dana.*

Genus CYPRIS, *Müller.*

Cypris oblonga, n. sp. (Pl. II., figs. 1-4.)

Elongate, subreniform; lower margin slightly sinuated; upper edge considerably arched, highest in the middle; extremities rounded, the posterior being the more obtuse. Seen from above, the carapace is ovoid in shape, the junction of the valves forming, towards the extremities, a well-marked keel, which is most prominent anteriorly. The valves are clothed with a few scattered hairs, and marked irregularly with one or more transparent patches, which appear light or dark according to the mode of illumination. Colour light brown. Length $\frac{48}{1000}$ inch; height $\frac{26}{1000}$ inch.

This species is nearly allied to *C. fusca*, which differs from it in being broader and more tumid, as well as in the surface-markings. The abdominal rami of the two species are also different, as may be best seen by a comparison of the figures (Pl. II., figs. 4 & 5). The "lucid spots" are much larger and more distinct in *C. oblonga*. It is perhaps worthy of notice that

* This paper appeared also in the *Annals and Magazine of Natural History* for January, 1864.

specimens of *C. fusca*, when steeped in solution of potash, impart to the liquid a beautiful purple colour. I have not noticed this with other species, but should suppose it likely to occur when a sufficiency of brown pigment exists in the shell.

The engraver has made the figures (1 & 2) too broad in proportion to their length.

Cypris oblonga was taken in a pond at Fenham, near Newcastle, in April, 1863.

Cypris striolata, n. sp. (Pl. II., figs. 12-17.)

Valves broadly subreniform; dorsal margin greatly arched; ventral margin slightly sinuated; anterior and posterior margins obtusely rounded; the highest part of the carapace somewhat behind the middle. Viewed from above, the carapace is much compressed, and tapering towards the extremities, of which the posterior is more obtusely rounded than the anterior. Surface of the valves smooth, and regularly marked with beautifully fine, anastomosing, longitudinal striations. Colour deep brown. Length $\frac{3}{100}$ inch; height $\frac{2}{100}$ inch.

This approaches very closely to *C. compressa;* and, except in the sculpturing of the carapace (which is very well-marked and characteristic) and the sinuation of its lower margin, I cannot find any feature which distinctly separates it from that species. The valves of *C. compressa* are more or less deeply *pitted;* and in no instance have I been able to find any trace of the striation which distinguishes the present species. The general contour of *C. striolata* is more nearly reniform, the lower edge being decidedly sinuated, and the extremities are not quite so abruptly rounded. It is also larger tnan *C. compressa.*

Habitat. Broomley Lough, Northumberland. April, 1863.

Cypris affinis, *Fischer.* (Pl. II., figs. 6-11.)

Cypris affinis, Fischer, Mémoires des Savants Etrangers, St. Petersburgh, vol. ii. p. 146, pl. 4. f. 1-11; Lilljeborg, De Crust. ex. ord. tribus Cladocera, Ostracoda, et Copepoda in Scaniâ occurrentibus, p. 116, pl. 11. f. 8-14.

Valves elongated, broad anteriorly ; upper margin arched highest a little in front of the centre, and with a slight gibbosity, from which it slopes gently backward; inferior margin sinuated ; extremities rounded, the posterior being much the narrowest. Valves sculptured with a reticulated pattern, giving somewhat a scaly appearance to the surface. Seen from above, the carapace is broadly oval in form, with pointed extremities. Colour olive-grey or brown. Length $\frac{40}{1000}$ inch; height $\frac{22}{1000}$ inch.

This species is easily distinguished by the peculiar sculpturing of the valves, which, in fine specimens and with good illumination under the microscope, resembles an exquisitely wrought pattern of silver filagree-work. The reticulations of which the ornament is composed are largest toward the extremities of the valves : across the middle of the carapace they are not very conspicuous, as the shell-structure is there much more condensed. The junction of the open work of the extremities with that of the closer central band is shown in Pl. II. fig. 7. It will be seen that, though very much compressed, the tendency to a radiate arrangement of the lacunæ (?) is continuous throughout.

I first found this species in a pond at Fenham, near Newcastle, in April of the present year; and it has since been taken by the Rev. A. M. Norman in two ponds near Sedgefield, county Durham, and again by myself near Whitburn, in the same county.

Genus CANDONA, *Baird.*

Candona virescens, n. sp. (Pl. III., figs. 1–5.)

Carapace elongated, compressed, rather higher in front than behind ; ventral margin slightly sinuated ; dorsal margin very gently arched; anterior and posterior margins rounded. Surface of the valves smooth. Seen from above, the carapace is compressed, widest in the middle, and tapering gradually toward the extremities. Colour a delicate sea-green, irregularly variegated with markings of a lighter hue. Filaments of superior antenna five long and seven short. Length $\frac{33}{1000}$ inch; height $\frac{14}{1000}$ inch.

This species was found in considerable abundance in a shallow

weedy pond at Ashburn, near Sunderland, in May, 1863. In shape it closely resembles Dr. Baird's figures of *C. similis;* and some specimens have, when fresh, two dark spots, which however disappear on drying: they seem to correspond with the eye and muscle-spots. When I first found my specimens I supposed that they might prove to be merely the young of *C. reptans*, as they are not unlike in shape to that species, though much paler in colour. But the absence of any brush of setæ on the lower antenna is of itself a sufficient character to separate the two species. I find that even the very youngest specimens of *C. reptans* possess these setæ quite distinctly developed.

CANDONA ALBICANS, n. sp. (Pl. III., figs. 6–10.)

Valves oblong. Dorsal margin straight, curving abruptly at the posterior extremity, and more gradually in front; ventral margin *deeply* sinuated; extremities obtusely rounded off. Surface of the valves uniformly and closely punctated, with a few scattered slender hairs round the anterior and posterior margins. Seen from below, the carapace is flattened, ovate, and produced into a fillet at the anterior extremity. Colour opaque white, uniform or with pellucid patches. Length $\frac{30}{1000}$ inch; height $\frac{16}{1000}$ inch.

I took a single specimen of *C. albicans* (from which the accompanying drawings were made) in fresh water near Sunderland, in 1861. It has been found plentifully this year, in a small grassy pond near Sedgefield, by the Rev. A. M. Norman, in company with *C. lucens*, *Cypris tristriata*, *C. affinis*, *C. ovum*, &c. With reference to his specimens, Mr. Norman remarks: "This species approaches very near to *C. lactea* (Baird), but is wider in proportion to its length, is not so ventricose, and wants the conspicuous encircling fillet of that species. The surface in *C. albicans* is excavated with very numerous, small, shallow pits; but in *C. lactea* it is only sparingly and finely punctate." In the figure of this species, the sinuation of the lower margin is not sufficiently pronounced.

Subgenus CYPRIDEIS, *Jones*.

Cyprideis torosa, *Jones*. (Pl. III., figs. 11–23.)

Cypridcis torosa, Jones, Entomostraca of the Tertiary Formation of England, 1856, p. 21, pl. 2. figs. 1 *a*–1 *i*, and woodcut, fig. 2, p. 16.
Candona torosa, Jones, Ann. & Mag. Nat. Hist. ser. 2, 1850, vi. p. 27, pl. 3. fig. 6.

Valves oblong, convex, somewhat broader in front than behind. Ventral margin straight, or with a *very slight* sinuation, frequently furnished with a single stout spine at the posterior angle; dorsal margin arched, higher anteriorly. Hinge-margin of the right valve bearing a series of corrugations or elongated tubercles, which are received into corresponding depressions of the opposite valve. Extremities obtusely rounded. The right valve is smaller than the left, and has the dorsal margin inclined more steeply, and almost in a right line, from before backwards. "Surface of the valves marked with closely-set angular pittings," and with a more or less conspicuous transverse sulcus somewhat in front of the centre. Young specimens are sometimes furnished also with a few short, thinly scattered hairs, and at the postero-inferior angle, near the spine before mentioned, there is often a conspicuous group of rather long hairs. Lucid spots arranged in a transverse row of about four, near the sulcus. Dorsal aspect ovate, irregularly and obsoletely angular. Length $\frac{35}{1000}$ inch; height $\frac{20}{1000}$ inch.

The occurrence of this species in a recent state was first mentioned by Professor T. Rupert Jones (*loc. cit.*), who obtained it from ditches of brackish water at Gravesend, and who has kindly supplied me with specimens from that locality for examination. These ditches are now, I believe, nearly silted up with mud and decompcsing matter. It has also been taken by the Rev. A. M. Norman on the sands at Weston-super-Mare, to which position it had probably been washed by the Uphill River. Mr. Norman has recently taken it in fresh water in the "Forge Dam," Sedgefield, and in immense profusion in brackish water at Hartlepool.

Lastly, I have myself found it in extraordinary numbers in estuarine pools at Warkworth.

The following table indicates the Crustacea with which *C. torosa* was found associated in the localities above specified:—

Sedgefield. (fresh water)	Gravesend. (brackish).	Hartlepool. (brackish).	Warkworth. (brackish).
Cypris ovum.	Crangon vulgaris.	Palæmon varians.	Crangon vulgaris.
—— gibba.	Cypris gibba.		Gammarus locusta.
—— cuneata.	—— aculeata.		
Candona serrata.	Candona lucens.		
—— reptans.			

The animal of *C. torosa* differs only very slightly from that of the genus *Cythere*. The limbs (except the first pair of legs, of which, owing to their minute size, I have not been able to obtain a satisfactory drawing) are represented in Pl. III. figs. 11-15. The only characters by which I can distinguish them from the limbs of *Cythere* are the absence, from the second joint of the inferior antenna, of the long stout seta which is always found in that genus, and the presence, on the coxæ of the last pair of legs, of four or five rows of long hairs having apparently a semiverticillate arrangement. The tufts of bristles which occur in other situations are similar in disposition to those of *Cythere*. Some of the longer setæ or hairs are terminated with a peculiar ringed and serrated armature, which is shown at fig. 15. This character is always confined to certain hairs, which are constant in position, and is found likewise in *Cythere*. I have not been able, in my recent specimens of *C. torosa*, to detect the regular tuberculation figured and described by Mr. Jones; but there is much difference in the various specimens, according to age and locality, and it is evident that considerable latitude must be allowed in this as well as in the spinous armature of the carapace. In comparatively few of the Gravesend specimens have I found any appearance of the single spine, while in those from Warkworth it is almost constant. I have frequently, in examining *C. torosa*, found the carapace almost filled posteriorly with a very large mass of ova. This fully accounts for the prodigious quantities in which the

species is found in favourable localities, such as those at Hartlepool and Warkworth, and is the more remarkable, as in *Cythere*, so far as I have observed, the ova are very few in number.

EXPLANATION OF THE PLATES.

Plate II.

Fig. 1. *Cypris oblonga* (Brady), dorsal aspect; × 30.
Fig. 2. Ditto, ventral aspect; × 30.
Fig. 3. Ditto, left valve; × 30.
Fig. 4. Ditto, abdominal ramus; × 120.
Fig. 5. *Cypris fusca*, abdominal ramus; × 120.
Fig. 6. *Cypris affinis* (Fischer), abdominal ramus; × 120.
Fig. 7. Ditto, shell-sculpture; × 310.
Fig. 8. Ditto, lucid spots; × 120.
Fig. 9. Ditto, ventral aspect; × 40.
Fig. 10. Ditto, dorsal aspect; × 40.
Fig. 11. Ditto, right valve; × 40.
Fig. 12. *Cypris striolata* (Brady), left valve; × 40.
Fig. 13. Ditto, dorsal aspect; × 40.
Fig. 14. Ditto, ventral aspect; × 40.
Fig. 15. Ditto, shell-sculpture; × 310.
Fig. 16. Ditto, lucid spots; × 310.
Fig. 17. Ditto, abdominal ramus; × 210.

Plate III.

Fig. 1. *Candona virescens* (Brady), right valve; × 40.
Fig. 2. Ditto, dorsal aspect; × 40.
Fig. 3. Ditto, ventral aspect; × 40.
Fig. 4. Ditto, superior antenna; × 100.
Fig. 5. Ditto, inferior antenna × 100.
Fig. 6. *Candona albicans* (Brady), left valve; × 40.
Fig. 7. Ditto, dorsal aspect; × 40.
Fig. 8. Ditto, ventral aspect; × 40.
Fig. 9. Ditto, shell-sculpture; × 210.
Fig. 10. Ditto, lucid spots; × 210.
Fig. 11. *Cyprideis torosa* (Jones), superior antenna; × 100.
Fig. 12. Ditto, inferior antenna; × 100.
Fig. 13. Ditto, second leg; × 100.
Fig. 14. Ditto, third leg; × 100.
Fig. 15. Ditto, ringed seta; × 400.
Figs. 16-18. Ditto, outlines of carapace (Gravesend specimens); × 20.
Figs. 19-21. Ditto, outlines of carapace (Warkworth specimens); × 20.
Fig. 22. Ditto, posterior margin, with spine; × 20.
Fig. 23. Ditto, with ova; × 40.

XII. — *A Catalogue of the Mammalia of Northumberland and Durham, by* Henry T. Mennell, F.L.S., *and* Vincent R. Perkins, *Honorary Members of the Tyneside Naturalists' Field Club.*

When, as secretaries to the Club, and rather to fill up a gap which no one seemed inclined to occupy, than from any peculiar fitness for the task, we undertook to prepare a catalogue of the Mammalia of the district, we expected—by reference to local collections, and from the information and assistance we could derive from our fellow-members (whom we had always found ready and willing to help us)—to accomplish the work with tolerable completeness and accuracy. But as

> The best laid schemes o' mice and men
> Gang aft aglee ;

so in our case has it happened that, by sudden and unexpected removal to distant localities, our original design was nipt in the bud, and we have both been deprived of all those local aids on which we had naturally so greatly depended; we would therefore willingly have abandoned the undertaking, or transferred it to more competent hands ; but the fates ruled otherwise, and we have been sternly held to our bond.

We have been compelled to draw largely on what may be termed " Historical Evidences ;" and as ancient writers on the history of our island usually commenced their lucubrations at a date anterior to the flood, so have we attempted to hide the poverty of our matter by copious notices of animals now, alas, no longer denizens of our forests and mountains.

In this catalogue we have adopted the system of classification proposed by Professor Owen, with only one exception. We have not ventured, in the face of the almost universal dissent of scientific men, to give to man more than an ordinal rank, and consequently have had to omit the class *Archencephala* which Professor Owen has prepared for his reception.

In this, and other points, we have endeavoured to give expres-

sion to the weight of authority, rather than to our own opinion, which would have little or no importance.

Professor Owen's classification is founded on the characters of the brain, and these appear to yield data for an arrangement more natural and harmonious than that based upon the dentition, or the structure of the locomotive organs.

It chiefly differs from the system of Cuvier in the re-arrangement of the sub-class *Unguiculata*, from which are taken the *Rodentia* and the *Edentata* (except the family *Monotremata*) to form the sub-class *Lissencephala;* and the *Marsupialia* and *Monotrematous Edentata*, to constitute the *Lyencephala.*

Owing to the large extent of uncultivated and wild country, which, happily for the Naturalist, is still to be found in our district, our Mammalian fauna is rich in species, and of considerable interest from the comparative abundance of some of the larger animals, such as the Badger and Otter, which cannot long contend against the murderous propensities of civilized man. It is strange, therefore, that so little attention has been paid to the subject by our members; and how little, the following enumeration of local works from which we have derived assistance will show.

An incomplete, but very interesting list of our Mammalia, is to be found in Wallis's delightful History of Northumberland (1769). In this work none of the smaller species are alluded to, but of the larger ones much of interest is recorded, the more important parts of which we have transferred, generally in the author's own words, to our pages.

In Brewster's History of Stockton, to which one of our ex-presidents—Mr. Hogg—contributed the Natural History portion, there is no mention of the Mammalia.

Sir Cuthbert Sharp's History of Hartlepool is equally silent, except that, probably as being doubtful and exceptional creatures, the "Cetaceous and Pennated Animals" are honoured with a passing mention. The "Porpess," "Grampus," and "Common Seal," however, exhaust the list of these.

In Mr. Selby's admirable "Fauna of Twizell," nineteen wild species of Mammalia are enumerated, but there is little remark

or detail accompanying the list, and the subject evidently was not to the author the labour of love, which everything connected with the ornithology of his district undoubtedly was.

The Transactions of the Natural History Society of Northumberland, Durham, and Newcastle-on-Tyne, only yield us one excellent description and figure of a whale, from the pen and pencil of Dr. Johnston of Berwick.

In the Proceedings of the Berwickshire Naturalists' Club, is to be found scarcely anything, except the Fauna of Twizell already alluded to, the remaining notices of Mammalia referring to Berwickshire and districts beyond our borders.

Our own Transactions, in like manner, yield us only detached and scattered memoranda, of which we have made all the use we have been able.

The old Chroniclers and Itinerants, whose works include, though they are not limited to, our district, have been carefully searched, and everything bearing upon our subject that could be gleaned from the charming pages of Holingshed, Leland, Baker, &c., has been transferred to ours.

As far as the materials in our own library and that of the Literary and Philosophical Society of Newcastle, enable us to judge, the Mammalian Fauna of most English counties has been scarcely less neglected than our own.

The Greenwich Natural History Club have published a list of the Mammalia of their district, containing 30 wild species and 9 domestic, 39 in all ; one of these is doubtfully recorded, and three are whales, instances of whose occurrence are not recorded in the present century.

A much more satisfactory, and indeed very excellent list of Mammalia, is contained in Garner's Natural History of Staffordshire (1844). It contains 29 wild species, or 37 in all; but, from its exclusively inland character, it is deprived of the marine species, which for purposes of comparison should be omitted from other lists.

Another very excellent local list occurs in "An attempt to ascertain the Fauna of Shropshire and North Wales," by T. C. Eyton, in the Magazine of Zool. and Bot., II., 537. This dis-

trict is of considerable extent, richly diversified, and includes much wild, and little-frequented country. It possesses, as we might expect, a numerous and interesting Mammalian Fauna, amounting to 26 wild species, or 35 in all.

The richest county list in mere number of species, with which we are acquainted, is contained in Couch's Cornish Fauna (1838). It is, however, deficient in localities and details, which, as regards rare species, are essential in such a work. The whales are a case in point, many of the rarest species of which are included, without any specific instance of their capture being given. These, of which two species are unrecognized by the best authorities, swell the list to 50 species, 41 of which are wild.

Of the 75 species of Mammalia usually included in the English Fauna, eight are exclusively met with in a domesticated state, viz.:—the Horse, Ass, Hog, Dog, Domestic Cat, Sheep, Goat, and Fallow Deer; and into most lists, in this category only is the Ox entitled to admission.

Our Catalogue contains 59 species, 50 of which are wild. Our northern latitude impoverishes our Fauna in Bats, or we might show a still greater comparative richness. That the Fauna of our district is naturally rich and has been well worked out, the following figures will show:—

	Wild Species.	Total Species.
British Fauna	67	75
Shropshire	26	35
Staffordshire	29	37
North Kent (Greenwich Club)	30	39
Cornwall	39	48
Northumberland and Durham	50	59

The wood-cut illustrations which occur in the Catalogue have been drawn on the wood by Mr. Mennell, and therefore make no claim to artistic merit.

The figures of the Grey Seal and the Whale are reduced from original drawings by Mr. John Hancock, for the use of which we have to thank that gentleman.

Our acknowledgements are due to the Rev. John F. Bigge, the Rev. H. B. Tristram, Edward Backhouse, William Backhouse, John Hancock, and other members, for much valuable information and assistance.

October, 1863.

Table of the Sub-Classes and Orders of the Mammalia, according to the Cerebral System of Professor Owen.

CLASS.	SUB-CLASS.	ORDER.	GENUS.	EXAMPLE.
Mammalia	Archencephala	Bimana	Homo	Man.
	Gyrencephala	Quadrumana	Catarhina	Ape.
			Platyrhina	Marmoset.
			Strepsirhina	Lemur.
		Carnivora	Digitigrada	Dog.
			Plantigrada	Bear.
			Pinnigrada	Seal.
		Artiodactyla	Omnivora	Hog.
			Ruminantia	Sheep.
		Perissodactyla	Solidungula	Horse.
			Multungula	Tapir.
		Proboscidia	Elephas	Elephant.
			Dinotherium	
		Toxodontia	Toxodon	
			Nesodon	
	Lissencephala	Sirenia	Manatus	Sea-cow.
			Halicore	Dugong.
		Cetacea	Delphinidæ	Porpoise.
			Balænidæ	Whale.
		Bruta	Bradypodidæ	Sloth.
			Dasypodidæ	Armadillo.
			Edentata	Anteater.
		Cheiroptera	Frugivora	Rousette.
			Insectivora	Bat.
		Insectivora	Talpidæ	Mole.
			Erinaceidæ	Hedgehog.
			Soricidæ	Shrew.
		Rodentia	Non-claviculata	Hare.
			Claviculata	Rat.
	Lyencephala	Marsupialia	Rhizophaga	Wombat.
			Poëphaga	Kangaroo.
			Carpophaga	Phalanger.
			Entomophaga	Opossum.
		Monotremata	Echidna	Echidna.
			Ornithorhyncus	Duck-mole.

MAMMALIA, *Linn.*

Sub-Class 1. GYRENCEPHALA, *Owen.*

Section 1. UNGUICULATA, *Ray.*

Order 1. BIMANA, *Cuvier.*

1. HOMO, *Linn.*

1. H. Sapiens *var.* Albus, *Linn.* Man.

α Europæus, et β Indicus (Gipsies).

Not being members of the Anthropological Society, we shall not venture to expatiate on the history of the human inhabitants of our counties: we shall therefore merely indicate the existence of the species, and remark, that the Northern yellow-haired division of the European type (*α Europæus, capillis flavescentibus*) is, in our islands, sustaining a severe "struggle for existence" against its Southern black-haired rival, and that "natural selection" appears to have an unaccountable predilection for the black eyes of the latter, and to be bent upon the elimination of those blue eyes, with which poets have delighted to adorn our Northern Beauties.

This curious question has recently been ably mooted in a popular journal; and a district like ours, in which the fair Northern type still predominates, is very favourable for its further investigation.

Præhistoric man is, we are glad to see, likely to receive the attention he merits at the hands of our late President and Dr. Embleton, and the interesting paper read by our fellow-member Dr. Wilson, of Castle Eden, at the late meeting of the British Association, on the habits of life among our pit population, and their moral and physical results, is a contribution to recent anthropology, which we hope will lead to a series of similar papers on those sections of our population, whose habits are peculiar and characteristic of the district. Our proximity to one of the great centres of the gipsy race (*β Indicus*), Yetholm, suggests another field of inquiry of much interest.

Order 2. QUADRUMANA, *Cuvier.*

This order has no British representative.

Order 3. CARNIVORA (Carnassiers) *Cuvier.*

Tribe 1. DIGITIGRADA, *Cuvier.*

Family 1. FELIDÆ.

1. CANIS, *Linn.*

1. C. lupus, *Linn.* Wolf.

That the wolf abounded in our district at no very distant period is abundantly evident, and we can readily conceive that the fastnesses of Cheviot would harbour the last of the race, down to a period little less distant, than that at which the sword of Ewen Cameron of Lochiel, ended their existence in Scotland in 1680. Positive evidence on the point is difficult to gather, but this need not surprise us, if we consider that it is precisely in those districts least known to the old chroniclers and itinerants, that the wolf would maintain itself the latest. Of this want of personal knowledge, Leland is an example, who, whenever he speaks of the central and north-western parts of Northumberland, prefaces his observations with the convenient introduction "I have heard saye."

We know that our Saxon ancestors called January, Wolfs-month, as being that in which the ravages of the animal were most to be dreaded; and in the tenth year of William I., Robert de Umfraville, the head of a family then and long afterwards very powerful in Northumberland, held the Lordship of Riddesdale by service of defending that part of the county against enemies and wolves.*

"In the time of Henry III.," says Brand, "Northumberland appears to have been infested with wolves, as I find by the foregoing entry in the Harleian MSS. (Duodecimo pars eschaetor, temp. R. H. fil. Reg. Johannis.) 'Idem Henricus tenuit de Rege in capite in com. Northumbriæ, manerium de Laxton, per serjentiam ad fugand. lupum cum canibus suis per quatuor

* Testa Nevilli, Blount's Ancient Tenures.

com.' And (undecima pars ibid.) 'idem Vitali tenuit manerium de Laxton de Rege in capite per serjentiam currendi ad lupum ad mandatum Regis.' "*

Bones of this animal have recently been found in Heatheryburn Cave, near Stanhope, associated with the remains of other animals, and with implements of human manufacture probably belonging to the first two centuries of our era.

Near Wallington some rocks are still called "Wolf's Crag," and on or near the border the names of Wolf-keilder, Woolf-lee on Wauchope-burn, Wolf-cleugh, Wolf-hope, &c., still bear testimony to the former existence of the wolf in these districts.†

Mr. James Clephan kindly refers us to the following "legendary lore." Reginald's life of his contemporary, Godric the Hermit, (who flourished at Finchale more than half-a-century, and died there about 1170,) speaks of the frequency of wolves in the county, and speculates on the origin of the name of Wolsingham, the scene of a hermitage at which Godric had graduated. Dr. Raine (who edits the biography) remarks in a note, "The first etymology, 'Habitatio Wlsi,' is the correct one; the second, 'Lupi Habitatio,' is incorrect; the third, 'Ululatus Lupi,' is unintelligible." The Doctor, we may grant, decides rightly as to the derivation; but we may fairly conclude from the passage that the district was familiar with the howl of the wolf. "When Harrison wrote his description, of Britain, in 1555, the wolf," says Dr. R., "had long been extinct in England." But, he goes on:—"Harrison adds, however, 'This is chiefly spoken of the south and south-west parts of the island. For we, that dwell on this side of the Tweed, may safely boast of our security on this behalf, yet cannot the Scots do the like in every point within their kingdom, sith they have grievous wolves and cruel foxes.' (Hollinshed's Chronicles, i. 378, edit. 1807.)" This may have been so; and yet, if we may rely upon the biographer of Ambrose Barnes, it is doubtful. There is a manuscript memoir of the Puritan alderman of Newcastle in the library of the Literary and Philosophical Society; and it is

* Brand, History of Newcastle, London, 1789, II. 393.

† Hardy on the Wolf in Scotland, Berwicksh. Trans. IV. 268.

therein stated that he had an ancestor, holding an estate under the Earl of Rutland and Belvoir, "commonly called Ambrose Roast-Wolf, from the many wolves he hunted down and destroyed in the time of Henry VII." Henry reigned from 1485 to 1509; and if wolves were numerous when he wore the crown, we may doubt if they were extinct in England before the sixteenth century closed. The wolf of the Tower, "exceedingly old," seen by Paul Hentzner in 1589, was possibly English, and caught in Harrison's time. It may, however, have been Scotch or foreign. "Diverse wolves," says the old historian, "have been brought over from beyond the seas for greediness of gain, and to make money only by the gazing and gaping of our people upon them, who covet oft to see them, being strange beasts in their eyes, and seldom seen (as I have said) in England."

In the Proceedings of the Berwickshire Club, will be found an interesting paper on the "Wolf in Scotland," containing evidence of its existence at a time much later than is generally supposed, as well as a collection of legends and folk-lore on the subject well worth perusal. We glean from this paper the following:—

A French writer, in 1538, says that though it was commonly reported that there were then no wolves in England, he was well assured of one having been seen on this side of Berwick. "Jay ouy dire vulgairement, que en Angleterre ny avoit poinct loups mais il puis bien asseurer den avoir veu pardeca Beruic."*

2. C. FAMILIARIS, *Linn.* DOG.

Although the dog cannot be included in the wild fauna of this, or any other district of England, its origin and history are sufficiently interesting to claim from us a few passing remarks.

Bell, in his "History of the British Mammalia," argues with much reason and probability that we must look to the Wolf as the parent-stock of all our races of dogs. The osseous structure, and general anatomy, the period of gestation, and other important points, are identical in the two animals. They have

* Les Sommaire des Antiquitez et Mervielles Descosse redige, et mys par Jehan de Moustier, escuyer. Paris, 1538.

been known to breed together, and to produce fertile offspring, which cannot be satisfactorily proved to be the case with the dog and the fox, which latter animal some writers consider to be the parent-stock of all our races of dogs.

Besides these arguments, there is, we think, a general tendency observable in the wild breeds of dogs, or in those which have relapsed from civilization to barbarism, to revert more and more to the wolfish type. Great as are the diversities between many of the races of dogs and the wolf, they are not greater than between one race of dogs and another; nor are they of themselves sufficient to destroy our belief in this theory, when we consider the wonderful effects produced by artificial selection on the pigeon and other domesticated animals, as is so graphically described by Charles Darwin in his "Origin of Species." He has, however, we think, failed to show that this modified power extends beyond the limits of a true species; and, wherever artificial selection has operated, the tendency to revert to the parent type is very remarkable.

The origin and inter-breeding of domesticated animals is, however, a question of much difficulty, being governed apparently by different laws to those of a feral state, and complicated by the influences of artificial and unnatural conditions.

One of the oldest and purest breeds of dog, the northern sheep dog or Colley approaches very nearly in general form and character to the wolf, and for this variety the county of Northumberland is famous.

Among the recently discovered remains of the ancient lacustrine habitations of Switzerland—remains co-temporary with the stone period of archæologists—have been found bones of dogs. These are probably the oldest attainable evidence in Europe of the co-existence of the dog with man, and the character of the remains may throw some light on the question under discussion. M. Rütimeyer describes the bones as very uniform in character, resembling somewhat those of the "jagdhund," and "wachtelhund," rough breeds of large size and wolf-like aspect.

That an animal so thoroughly domesticated, and so faithful and true a companion to man would, if neglected, in a very short

space of time revert to a state of wildness, the following anecdote, which we extract from Bewick,* will testify:—

"In December, 1784, a dog was left by a smuggling vessel, near Boulmer, on the coast of Northumberland. Finding himself deserted, he began to worry sheep; and did so much damage, that he became the terror of the country within a circuit of about twenty miles. We are assured that when he caught a sheep he bit a hole in its right side, and, after eating the tallow about the kidneys, left it. Several of them, thus lacerated, were found alive by the shepherds; and being taken proper care of, some of them recovered, and afterwards had lambs. From his delicacy in this respect, the destruction he made may in some measure be conceived; as it may be supposed that the fat of one sheep in a day would hardly satisfy his hunger. The farmers were so much alarmed by his depredations, that various means were used for his destruction. They frequently pursued him with hounds, greyhounds, &c.; but when the dogs came up with him he laid down on his back, as if supplicating for mercy; and in this position they never hurt him: he therefore laid quietly taking his rest till the hunters approached, when he made off without being followed by the hounds, till they were again excited to the pursuit, which always terminated unsuccessfully. It is worthy of notice that he was one day pursued from Howick to upwards of thirty miles distance, but returned thither and killed sheep the same evening. His constant residence, during the day, was upon a rock on the Heugh-hill, near Howick, where he had a view of four roads that approached it; and in March, 1785, after many fruitless attempts, he was at last shot there."

A very similar circumstance occurred during last year in the neighbourhood of Shields. A large dog, having no owners, took to a wild life, and committed great depredation among the sheep.

3. C. Vulpes, *Linn.* Fox. Tod. *Female* Vixen.

Abundant in both counties.

The Scotch name of this animal, Tod, is also used in Northumberland, and occurs as an element in the names of places

* Bewick's History of Quadrupeds. 1824, p. 333.

in the county, for instance Todburn. It is of Gaelic origin, signifying a mass of wool, and has been suggested by the bushy tail, or, in sporting phraseology, the *brush* of the fox.

Fox-hunting is as popular here as elsewhere. Six packs of hounds divide our district between them, viz., the Morpeth, the Alnwick, the Tynedale, the Haydon, the Durham County, and the Hurworth packs.

In the Northumberland division, the Morpeth and the Tynedale are the two principal packs, each hunting three alternate days a-week, the former Tuesday, Thursday, and Saturday, the latter Monday, Wednesday, and Friday.

The Morpeth pack contains thirty-seven and a half couples of hounds. John Cookson, Esq., of Meldon Park, is the master, Mark Robinson huntsman, and Thomas Marlow whip. The kennels are at Newminster, Morpeth.

The Tynedale is under the able mastership of Major Bell. The pack contains forty couples of working hounds; the huntsman is James Fierr; William and Thomas Nevard are the whips. The kennels are at Stagshaw Bank.

The Haydon hounds are a "scratch" pack, having no kennels, but kept at various houses, chiefly of farmers. They consist only of nine couples, and are, we believe, under the management of Mr. William Langhorn; the huntsman is Robert Bruce. They hunt on Wednesdays and Saturdays over a difficult country, but with considerable success, killing more foxes, we understand, in proportion, than the Tynedale. They meet at the primitive hour of nine a.m.

The Alnwick pack is new. We believe, also a "scratch" or "trencher fed" pack.

In addition to these, the Duke of Buccleuch's pack hunt the country to the far north.

The Durham County (Sedgefield) pack contains fifty-one couples; they hunt four days a-week, viz., Monday, Tuesday, Thursday, and Saturday; J. Henderson and J. Harvey, Esqs. are the masters, Mark Carr the huntsman, and Stephen Winkworth whip. The kennels are at Sedgefield and Farewell Hall.

The Hurworth, hunt three days a-week. The pack consists

of forty-two and a half couples of working hounds. J. Cookson, Esq., is master. The kennels are at Hurworth.

2. FELIS, *Linn.*

1. F. Catus, *Linn.* Wild Cat.

This fine animal, sole British representative of the typical carnivores, is not, we fear, now to be found in our district, although very few years have elapsed since it could be claimed for our Fauna, and many instances of its capture during the past thirty years, might doubtless be added to those given below.

In his Fauna of Twizell, Mr. Selby says it was to be met with within three miles of that place, twelve years previous to the time of his writing.

A specimen killed in Brislee woods, near Alnwick, many years ago, is now, or was recently, preserved in Brislee Tower.

At Castle Eden, Mr. Tristram informs us, it has been extinct for about twenty years.

The present Lord Ravensworth shot a specimen in the woods near his seat at Eslington, in the year 1853.

2. F. domesticus, *Linn.* Cat.

This species, probably of North African descent, differs greatly from the wild British species, and cannot easily be mistaken for it by those who know the latter animal. Individuals of this species which have betaken themselves to the woods, where they live in a state of wildness, are, however, often called by gamekeepers and others wild cats.

3. MUSTELA, *Linn.*

1. M. vulgaris, *Linn.* Weasel.

This animal is very abundant throughout our district.

2. M. erminea, *Linn.* Stoat. Ermine. Winter Weasel.

This species is quite as common in our district as the preceding one, and in the uplands probably more abundant. At St. John's, in Weardale, Mr. W. Backhouse has frequently

noticed it in its white winter dress, and Mr. Richard Howse on Knarsdale Fells.

3. M. FURO, *Linn.* FERRET.

This animal is only known in this country and elsewhere, in a semi-domesticated state, but is supposed to have been originally indigenous in Africa, and perhaps in Spain, whence it spread over Europe. It is not able to endure the cold of our winters, against which it requires to be carefully protected. Its great services in the destruction of rats and rabbits are well known. A cross between the female ferret and male polecat is often obtained for the same purpose, and is even more highly valued than the pure breed.

3. M. PUTORIUS *Linn.* POLECAT. FITCHET. FOU'MART.

Putorius vulgaris, Cuv.

Of this animal Wallis says, "It is found in Northumberland in stony hillocks, thickets, and furze near villages and farm-houses, and is usually called Fou'mart from its intolerable scent."

It is still plentiful in both our counties. The Rev. G. C. Abbes tells us that a very fine polecat visited his garden at Cleadon a few years ago, and was so bold and fearless that it came close to him when gardening, and suffered him to push it back with his rake when it interfered with his work.

It is called the *Fou'* or *Foul-mart*, in contradistinction to the *Sweetmart* or Marten shortly to be mentioned.

Localities:—Stamfordham, Rev. J. F. Bigge; Castle Eden, Rev. H. B. Tristram; Darlington, W. Backhouse; Cleadon, Rev. G. C. Abbes.

MARTES, *Cuvier.*

1. M. ABIETINUM, *Ray.* MARTEN CAT.

M. vulgaris, Cuv.; Mustela martes, Linn; Martes abietinum, Pine marten; *Martes foina,* Beech marten.

There seems to be scarcely sufficient ground for the division of the marten into two species. T. C. Eyton, Esq.,* has clearly

* Ann. Nat. Hist., VI. (1840) 290. See also Bennett in Gard. and Menag. of Zool. Soc., I., 230. Bell.

proved that the colour of the breast is dependent on age and season, and is not a specific character. The Rev. L. Jenyns* considers, however, that certain differences in their crania divide the marten into two species.

Both forms or species are doubtless met with here, and although the animal cannot be called common, it is widely distributed over both counties.

Wallis says of it, "the marten is one of our mountain and wood inhabitants, near houses; it lives on birds, mice, and other small animals. The late humane and lamented Edward Charleton, Esq. of Reedsmouth had a young one taken in that neighbourhood, which, by kind treatment, grew as tame and familiar as his other house animals and continued with him two years, brisk and lively."

Localities:—Northumberland—Slaley, near Hexham (1858), Edward Backhouse; Unthank, Rev. J. F. Bigge.

Durham.—St. John's, Weardale. "I have two specimens of the Pine Marten killed here a few years ago;" William Backhouse.

5. LUTRA, *Ray*

1. L. VULGARIS, *Erxleb.* OTTER.

Mustela Lutra, Linn.

Our district at the present day may, we think, very properly be designated as the head quarters of this fine animal. It is abundant in all the rivers and larger streams, and even the smaller burns can often testify to its predatory visits. Increasing population, combined with bitter enmity to this terrible foe of the finny tribe, has almost exterminated the otter in many parts of the country where it was formerly abundant, and caused it to retire to wilder, more remote, and less frequented districts. In haunts like these, and especially in North Northumberland, the otter exists in, comparatively speaking, undisturbed security, and long may it continue to do so.

Perhaps we might say that the otter is, in some measure, preserved for the exciting sport of "otter hunting," which in this district still maintains its ground as a popular sport. Several

* Ann. Nat. Hist. VII., 262.

packs of hounds are, or were recently, maintained in the two counties, specially bred and trained for the purpose; and that of Mr. Gallon, of Bishop Auckland, is well known to all sportsmen as the best trained and most carefully selected pack in the kingdom. To this gentleman we are indebted for the following interesting account of

OTTER HUNTING.

"From about the year 1750 until the middle of the eighteenth century otter-hunting was held in great repute in some of the districts of the county of Durham; Stockton, Hurworth, and Croft being much famed for their breed of otter hounds.

The river Tees being a water well adapted to the sport, the pursuit of the otter was followed with great enthusiasm. As the capture and death of the quarry was the great desideratum, it was usual on these occasions for the biped participators to be so amply provided with spears, leisters, prongs, and other shaft instruments, that an expedition of this kind partook more of the prestige of the tournament than a hunt; hounds then being considered more as auxiliaries than primary movers in the chase.

A diversity of opinion exists respecting the requirements necessary to constitute an otter hound, some pertinaciously contending that the essentials of such an animal are lowness of stature, great length of body, capaciousness of head, in addition to the indispensable concomitants of crooked legs; others there are who as persistently maintain that old draft (and bordering on the worn out) fox hounds comprise the desired elements of an otter hound. In reference to the former, although it may be hardly necessary to remark that malproportion and illfavouredness in otter hounds are no more a perfection than in other animals, it may not be quite superfluous to add that notwithstanding fox hounds may occasionally do, on a fresh drag, and when an otter is newly put up, or unkennelled, and in a small river, yet, under other and more adverse circumstances, they are not to be depended upon. And as it requires many years of education to form the hound, as well as the common mind, it follows that there is a better prospect of successfully attaining a desired object when the faculties are in vigour and perfection

than when they are impaired or on the wane. Moreover, fox hounds cannot be relied upon when a check occurs, their former tutoring then inducing them to leave the river in search of their legitimate game on land. Furthermore, the adoption of fox hounds (with few exceptions) is made with the sacrifice of that fine, deep-toned concert of sounds, which is the most inspiring part of an otter hunt. In the absence of any authority, it would be egotistic to maintain that there is now (or ever has existed) a distinct breed of otter hounds. The Hurworth had its origin in a cross between the old Southern or Talbot and the rough-haired hound, the last probably a cross between the rough Terrier or Retriever and the Southern hound.

Although the number of hounds necessary to constitute a pack is mainly dependent upon the inclination or means of their owner, yet there are other circumstances that exert an influence in this respect, viz., the size of the rivers likely to be hunted, and the number of days per week intended to hunt. Uniformity in the size of hounds is not essential, but rather the reverse, as large hounds are required in big or rapid currents, and smaller ones in reaching the recesses of roots and banks. Hounds from 18 to 23 inches high, as a general rule, are most serviceable, and from six to ten couples (with the addenda of three or four terriers) sufficient to hunt three days a-week any of the rivers in Northumberland or Durham. In most rivers there are particular places where it is more than problematical whether an otter can be fairly hunted down, with even more than the number of hounds stated; such are Chollerford and Chipchase Castle dams, in the Tyne, which are by analogy the Dinsdale locks or Eshes of the Tees, and the Bothal and Sheepwash of the Wansbeck.

The Tees-side or South Durham hounds were kept in small detachments, by different parties, and at different places, but of late years the sport has been gradually on the decline, and at the present time is nearly obsolete on that river. The Wear, Derwent, and their tributaries, are not much frequented by otters, being only visited *en passant* by emigrants from the Tyne to the Tees. Why otters do not permanently settle on these waters may be ascribed to the great influx of lead-hush, or wash from

the mines in the west, which not only destroys their food, but must be otherwise at variance with their habits.

Similar circumstances may explain why otters are so seldom found, or noticed in the South Tyne, while its sister of the North is so prolific of that animal.

Several localities in Northumberland have at different periods encouraged the sport of otter hunting. Thus, about the year 1828, Walter Trevelyan (of Newcastle), Esq., kept a small pack, but not persevering long, he met with very indifferent success. Of later years, Hexham, Bellingham, Morpeth, and Wooler have each conduced to the sport. The followers of the hunt at the two former places captured several otters in the higher parts of North Tyne, where the favourable circumstances of low waters, knowledge of the river, and the matured experience of "Tom of the Mill" at Reedsmouth were great accessories to success. The Wansbeck is not a river favourable for otter hunting, for although it generally contains game, the rocky nature of the river in some parts, and the numerous and extensive drains at the high part of the water, preclude the probability of a find in favourable ground. Some parts of the Coquet, such as Brinkburn and Harbottle, offer very fine hunting grounds. Mr. John Thompson, of Wooler, kept a small establishment for three or four years. It comprised hounds mainly from the kennel of John Gallon, then of St. Andrew's Auckland. The river Till and its tributaries are very favourable for otter hunting, except the lower parts of the river below the junction of the Glen; and below and about Ford, although game is abundant, it is very difficult and precarious ground. While Mr. Thompson kept hounds he was fairly successful, so far as his account of killed was a criterion; but this result was, with few exceptions, obtained through the unwarrantable use of the spear, and sometimes with the aid of other and more explosive weapons.

The rivers Pont, Blyth, and Aln are, for the most part, not favourable for otter hunting, being too still, banky, and reachy, and wanting those intervals of stream which afford such an agreeable variety to an otter hunt.

The only otter hounds which claim any system of organiza-

tion in this locality are those kept by John Gallon, now of Tow Law. He is in possession of the direct (and only) strain of the Hurworth Joyful blood, and having kept hounds for nearly a quarter of a century, and intermixed this strain with fresh and approved importations from other kennels, with the additional advantage of a small pack presented to him by Lord Middleton of Birdsall, he is able to show good sport in the border rivers.

Through the kindness of the proprietors, he is endowed with extensive leave to hunt most excellent waters in different parts. This privilege he has acquired in consequence of the steadiness of his hounds, as well as the fair manner in which he hunts his game. He does not consider a kill as the only redeeming feature of a hunt, nor hold it in such estimation as to secure it at the cost of fair play to an animal that offers such good sport, and against which the odds, so far as numbers are concerned, are so considerable at the commencement. When the pursuit of the otter ceases, the pleasure terminates.

Here it may not be out of place to repudiate and protest against the use of spears as accessories in the pursuit of the otter. In the majority of cases in which these unsportsman-like accompaniments are tolerated, they assume the most prominent position in the affair. No sooner has the otter broken cover, than the spearmen are on the alert for the first chance that presents itself of transfixing the game, and thus ingloriously acquire the credit of immolating an animal that has probably up to this time afforded infinite amusement, and would, if fairly permitted to reach its swimming ground, have probably given an exciting hunt of many hours' duration.

The advocates of this barbarous practice are apt to plead mercy to the otter as an extenuation of their inhuman prowess. Long may the River Conservator be saved from his friends! His ignorance of the spear is indeed to him a bliss. Those who have once witnessed the successful hurl of the spear, and the writhings of the impaled animal as it painfully drags, for hours, the pledge of mercy through the deep, or seen its agonizing efforts to release itself, will soon elect to leave it to the brief and more humane dealings of the canine race."

A contributor to the "Field," under the signature of "Plunger," has recently given an interesting account of the habits of this animal and his experience in hunting with the Wooler pack, from which we make the following extracts:—

He tells us that "the scene of his apprenticeship was at Wooler, Northumberland, and the hunting grounds, or more properly speaking, waters, were the Till, the Glen, the Bowmont, the Aln, and Breamish in Northumberland; and the Tweed, Whiteadder, Blackadder, and Eye in Berwickshire; a beautiful cast of waters for the sport, as in most of them otters abounded, especially in the Till, where they were very numerous; often as many as half a dozen lying on different portions of the river at the same time. It was, besides, an excellent school in which to teach a pack its duty, being a most difficult river to hunt, unless the hounds are thoroughly up to their work, and even then the chances are very largely in favour of the otter, as its deep opaque waters are for the most part bounded on each bank with matted fringes of willows and alders, or, in such parts as are destitute of these, by huge masses of dead thorns, which are put in as weirs to save the banks. These dense impenetrable masses, though affording excellent harbour for otters, are, nevertheless, unmitigated nuisances to the hunter, as it is almost impossible to bolt an otter from them, or to finish with a kill in their vicinity.

"The technical terms used in otter-hunting are as follows, viz., his hole or earth is called his *couch* or *hold;* his foot-prints, his *seal* or *print;* his excrement, *spraints* or *swage;* the small bubbles of air which he emits to the surface while diving across the bottom of the water, his *chain.* When he rises to the surface to breathe he is said to give *vent;* when he leaves his hole he is said to *bolt;* when he remains for some time to regain his wind or elude his pursuers under an overhanging bush or bank during the chase he is said to *hang;* the scent left on his track over the land is called his *drag;* when a sportsman follows his footprints he is said to be *tracking* him; when viewed he is saluted with a '*tally ho,*' the same as the fox, and when killed he is duly honoured by as lusty a '*whoo whoop*' as the lungs of the party,

generally none of the weakest, can afford; at the same time he is elevated upon the top of a spear in the centre of the baying and clamorous pack and is then said to be *poled*.

"The favourite place for the otter to locate his couch is in a deep, still part of the river, where the banks of dry sandy soil rise a few feet sheer from the edge of the water, which must be of sufficient depth against the bank at the bottom to admit of the mouth of his hold being quite under the surface; if trees or bushes clothe the surface of the bank, so much the better. The mouth of the hole is invariably under the surface of the water, while it is dug in an upward direction high into the dry bank, where a comfortable couch of dry grass and moss is formed. The couch has always a communication with the surface by means of a small hole, having its orifice usually in the midst of a bush, long tuft of grass, or other cover, for a due supply of the necessary air; and it is the scent of the animal issuing from the ventilater that enables the hounds to discover his whereabouts in their questings along the banks. This orifice is not usually larger than a mouse-hole, and so carefully concealed that it is impossible to find it otherwise than by scent; and it is difficult to conceive how a large animal like the otter can possibly contrive to dig such a minute gallery, unless we suppose that he merely appropriates that of a water-rat or mole to his own use—which supposition is most probably correct, as it would seem a task of no small difficulty for the animal to excavate in the solid bank a burrow whose orifice being below water could not admit of respiration being carried on during its formation, unless he availed himself of the subterranean galleries of some smaller animal previously communicating with the surface.

"The otter, in his habits, is decidedly a nocturnal animal, endowed with crepuscular vision, and seldom or never quitting his couch by day, unless disturbed; but as soon as the shades of evening begin to close in, forth he issues in quest of his prey. In his fishing expeditions he will pursue his course up stream rather than down, and any one unacquainted with his habits will scarcely believe the distance which he will travel in a

single night, along the course of a river, usually from ten to fifteen miles, and seldom less than eight or nine. His manner of proceeding on these excursions is as follows; after leaving his couch he usually swims until a bend in the river occurs, when he leaves the water and cuts across the land to the next bend; he then enters the water which he keeps until another short cut across the land brings him to a second bend in the river. Thus he proceeds alternately upon dry land and in the water until he reaches the termination of his beat, when he enters a previously prepared hold, or returns in a similar manner to the one he left.

"There is considerable disparity in size between the male and female of this animal; the former, when full grown, usually measuring from 3 feet 8 inches to 3 feet 10 inches from the tip of the nose to the end of the tail, and averaging in weight from 24 lbs. to 25 lbs., while the latter does not generally weigh more than 17 lbs. or 18 lbs. I believe the Bishop Auckland pack once killed a giant of 32 lbs. weight; but this "Saul among the people" must be regarded as a very extraordinary specimen, and far beyond the usual size.

"As compared with the other weasels, the otter is thicker and stronger in the body, shorter and stouter in the limbs, flatter in the head, and shorter and rounder in the muzzle, with the eyes placed more upon the upper surface of the head, and nearer to the nose; while the feet are large, round, and webbed between the toes, the number of which is five. The print of the foot of a full grown dog otter is quite as large as that of a medium sized dog, from which it may be easily distinguished by a practised eye, by being much more circular in shape, with the toes more widely spread, their pads more deeply indented and ball-like in form, and the claws shorter and directed more perpendicularly downwards; while the print of the dog is compressed towards the point of the toes, and altogether of a more triangular form with the claws pointing horizontally forwards. After seeing the prints of the two animals side by side and comparing their peculiarities with each other the difference will be manifest; but few, who have not had the opportunity of doing

so, would not at once pronounce the otter's seal to be that of a middle sized cur.

"On examining the nostril of the otter it will be found that special provision is here made for his amphibious mode of life, as the exterior flap of that organ is so constituted as to be capable of shutting like a valve, thereby completely excluding the water from the air passages during the animal's diving excursions in pursuit of his prey. The teeth of the otter are large and powerful, while the muscles of the neck and those of the cheeks which compress the jaws are exceedingly powerful and well developed, giving a muscular power to the jaws equal to that of the bull-dog, so that he is enabled to bite with the cruelty and retain his grip with the pertinacity of that animal; while in tenacity of life, litheness of body, and sullen contempt of pain he is much his superior, and I am certain that a full grown dog-otter would be more than a match for any bull-dog of the same weight in a single-handed contest upon equal terms. There is only one tender part in the body of the otter, where he can be assailed with fatal effect and it is a very fatal one, viz., the top of the skull, which is very thin and easily penetrated by the tusk of a dog, or broken by a blow from a stick; but on all the other parts of the trunk the skin is so thick and loosely attached to the integuments beneath that a whole pack of the hardest biting hounds may worry away at him for a whole day without ever penetrating it.

"That the otter can be reclaimed so as to become as familiar as a dog we have proof, provided he is obtained very young. A person in the village of Rothbury, Northumberland, had one a few years ago, which used to run about at his liberty, play with the dogs and gambol with the children, of whom he seemed particularly fond, and would come to his master when called by the name of Ben, and accompany him to the river Coquet, which was within a hundred yards of the house where he was kept, and after a dive at the fish would again emerge and follow him quietly home without ever evincing the slightest inclination to return to his natural mode of life.

"Instances of pure white, and cream-coloured otters, although

very rare, have sometimes occurred; two of the latter colour, which are now in the possession of Mr. Grey of East Bolton, having been killed in the river Aln, Northumberland, a few years ago. I have also seen in Newcastle-on-Tyne a stuffed specimen of a female, spotted all over the body with white ticks, precisely similar to some pointer dogs."

Besides the instances above mentioned there is preserved at Wallington a cream-coloured specimen which was killed in that neighbourhood.

The otter brings forth from three to five young ones in the season, about midsummer.

Tribe 2. PLANTIGRADA, *Cuvier.*

Family 1. URSIDÆ.

1. MELES, *Brisson.*

1. M. taxus, *Chev.* Badger. Brock. Grey.

Ursus Meles, Linn. *Meles vulgaris*, Desm.

This interesting animal—the sole existing British representative of the Bear family—is still to be met with in considerable numbers in many parts of our district.

Although we have collected a long list of localities, we still have no reason to suppose that it in any way approaches completeness, as the Badger is now, as it was in the days of old Wallis, "frequent in the woods and by the sides of rivers in the Alpine vallies of Northumberland."

The local name of the animal is Brock, which may be traced in the names of many places in our district, as Brockley Whins, Brockden, &c. To another provincial, but once generally used name for the badger, namely, Grey, the greyhound owes its name. This breed of dog, however, must have considerably changed its character since it was employed in chasing Greys. The Rev. H. B. Tristram tells us that "it is not uncommon in Castle Eden Dene, where, in the winter, its tracks are often seen on the snow. A pair, which were caught in this dene at an interval of two years, bred in confinement, and had four young, which were reared. Two of these are now in the gar-

dens of the Zoological Society in London. They live in holes in the limestone in the dene."

Of one caught at Hedley Wood, near Weldon Bridge, the Rev. John F. Bigge writes that "the keeper having seen its track, placed a trap at the mouth of the hole in which it took refuge, and for three weeks the animal never stirred out. At the end of this time the keeper took the trap one evening to the blacksmith's to be repaired, and in the morning it was found that the badger had issued forth and made its escape, and it was not caught until some weeks afterwards. When taken it was very quiet, and in a few days became perfectly tame."

The Rev. Wm. T. Shields, of Warden, writes, "Badgers are now almost extinct here. There were some in Aydon Dene ten years ago, but having taken possession of the fox breeding earths, they were trapped—four were captured. Mr. W. Langhome tells me he saw one at Haydon Fell about two years ago.'

Localities.—Northumberland: "Hedley Wood, on the Coquet near Weldon Bridge; Baty's Crag, near Cocklaw; Birkey Dene, near Aydon, Corbridge; Hareshaw Linn, Woodburn; Brockhill, Stamfordham; Long Nursery, Gilchesters, Dissington; Bewick, on Breamish"—*Rev. J. F. Bigge.* Durham: "St. John's, Weardale"—*William Backhouse.* "Castle Eden Dene"—*Rev. H. B. Tristram.* "Banks of the Wear near Lumley; Softley Wood, Knarsdale"—*R. Howse.*

TRIBE 3. PINNIGRADA. *Owen.*

PINNIPEDIA. *Illig, Bonap.*

AMPHIBIA OR FERÆ AMPHIBIÆ. *Cuvier.*

FAMILY 1. PHOCIDÆ. *De Selys Longch.*

1. CALLOCEPHALUS, *Fred. Cuvier.*

PHOCA. *Linn.* (In part.)

1. C. VITULINUS. *Fr. Cuvier.* COMMON SEAL, SEA DOG, SEA CALF.

C. vitulinus, Gray (*Cat. Seals*, 21). *Phoca vitulina*, Linn.

The Sea Calf or Seal is not uncommon along our coast although its numbers have been greatly reduced during the past ten years. Of the largest colony—at the mouth of the Tees—Mr. John

Hogg contributed an account to Bell's History of British Quadrupeds, page 266.

Through the kindness of Mr. Edward Backhouse of Sunderland we are enabled to give the following particulars respecting this interesting colony, obtained from Mr. John Franklin of Seaton Carew, an enthusiastic seal-hunter. "Between the years 1820 and 30 about 1,000 seals frequented the mouth of the Tees, of which as many as thirty might often be counted at one time. Last year the number was reduced to three, which still survive. The seals exhibit great dread of the steamboats, which have greatly increased in numbers on the river during the last few years, and at the same time the population in the neighbourhood has increased enormously; to these causes may be attributed the rapid decrease of these animals."

"The weight of a large number killed by our informant varied from four to sixteen stones; the old ones average about fifteen stones, and are about four feet in girth and four and a-half feet in length. One washed up at Stranton, not mottled, weighed twenty-five stones." (This was probably a specimen of the grey seal, *Halichœrus Grypus*.) "The usual colour of the seal is mottled or light grey, the younger ones are often dark coloured but still mottled; the largest ones are generally the lightest in colour."

Another colony exists on the coast of Northumberland, opposite the Fern Islands, and round Holy Island, extending along the coast northward to Berwick. It is of this colony that Wallis speaks when he says "This animal often leaves the sea to sleep on the sea rocks near Berwick-on-Tweed. To prevent danger by surprise one of them usually stands sentinel to give the rest notice, and if attacked they defend themselves with an extraordinary courage, casting stones by the help of their hinder legs with a surprising violence, and sometimes to a great distance, upon their assailants. Being in less fear of women than of men, they often fall by the hands of men attired like women."*

Stray specimens occur along the coast at other places, as for example at Marsden, where one was caught and placed in a tub

* Wallis' Hist. North., 414.

of water, in which it was shortly found *drowned*, to the great astonishment of its captors who took it for a fish.

Sir Cuthbert Sharp mentions it as occurring at Hartlepool, in his history of that place, and the Rev. H. B. Tristram informs us that it is occasionally seen at the Black Hall Rocks, near Castle Eden; these are no doubt stragglers from the Tees settlement.

2. HALICHÆRUS, *Nilsson* (*Scand. Faun.* I. 377.)

1. H. GRYPUS, *Nilsson* (*Sc. F.* I. 377, t. 34, f. 1, 2). GREY SEAL, *Bell* (*Brit. Quad.* 284).

H. griseus, Nilsson and Horns (*Isis* 1824, 810). *H. gryphus*, R. Ball (*Trans. Roy. Ir. Acad.* xviii., 1, 2, 3).

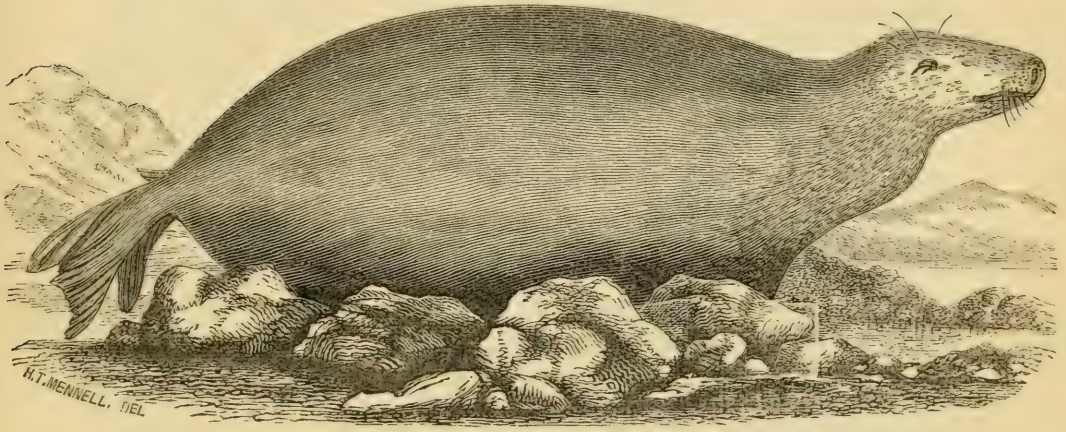


Fig. 1. *Halichœrus Grypus.* Adult gravid female, after drawings by John Hancock, Esq.

This fine Seal is still tolerably abundant around the Fern Islands, notwithstanding the great destruction of it, which was carried on many years ago, before the inhabitants of the Islands were protected by Archdeacon Thorp.

We have never visited the Fern Islands without seeing two or three individuals of this species which would raise themselves out of the water to watch our movements, especially if their curiosity were excited by whistling or other noises.

This species was formerly confounded with *Phoca barbata*, a species to which all large Seals were at one time referred by English writers, but which is now suspected not to occur on the British shores.

P. J. Selby, Esq., was the first to point out the error, and to refer it to the *Halichœrus Grypus* of Nilsson. In the same paper he describes the habits and economy of the animal, and states that one Seal hunter killed no less than 75 young Seals in the year 1772, and on another occasion 14 old ones in one day on the Crimston Rock, one of the smallest islets of the Fern Islands group, on which they chiefly calve. Mr. Selby states that the calving takes place about the 10th or 15th of November, but this date seems not to be quite regular in all cases, as a fine adult female taken on the Northumberland Coast on the 8th October, 1858, contained a fully developed fœtus, exceeding in size the dimensions of the young after birth given by Mr. Selby. This individual must, we think, have calved within a very few days of its capture. The adult specimen and calf were purchased by the Natural History Society and stuffed by Mr. John Hancock, and are now exhibited in the Newcastle Museum. They were both described by that gentleman in a short paper in our Transactions, vol. iv, p. 43. (*See figure.*)

The adult female measures upwards of 7 feet in length, and 4 feet 10 inches in girth immediately behind the fore feet. The young one is 3 feet $3\frac{1}{2}$ inches in length, and is covered with long silky hair, of a uniform dirty white or cream colour, much softer and longer than that of the adult, which is of a silvery grey of variable intensity with darker spots or blotches disposed chiefly about the sides of the neck and on the fore legs. The hair is stiff and short and darker in colour towards the base, so that a specimen appears much darker when viewed by a person standing at the tail, than when he looks at it from the head, as in the former position his eye to some extent penetrates the fur.

The male attains to a greater size than the female, sometimes measuring 9 feet in length. Its favourite food is the Lump Fish. The curious convolute or twisted character of the whiskers and of the bristles about the eye is well shown in the specimen in the Museum.

SECTION II. UNGULATA, *Ray.*

ORDER I. ARTIODACTYLA, *Owen.*

TRIBE I. OMNIVORA, (BELLUÆ, *Linn.*)

FAMILY I. SUIDÆ.

I. SUS, *Linn.*

1. S. SCROFA, *Linn.* (*aut* SCROFFA).

SWINE. *Male*, Boar. *Female*, Sow.

The Pig is not uncommon in our district, but alas, its noble progenitor, the

WILD BOAR, (*Sus Aper*, *Linn.*)

no longer roams our forests as he did in days gone by.

The names of Brancepeth and Brandon still recal these times, and tradition also asserts that a mighty Boar or Brawn, the monarch of his race, made his lair on Brandon (Brawn-den) Hill, and walked the forest of Brancepeth (Brawn's Path), as Surtees describes, "in undisputed sovereignty from the Wear to the Gaunless." "The marshy and then woody vale, extending from Croxdale to Ferry Wood, was one of the Brawn's favourite haunts, affording roots and mast, and the luxurious pleasure of volutation. Near Cleve's Cross, Hodge of Ferry, after carefully marking the boar's track, dug a pitfall, slightly covered with boughs and turf, and then *toling* on his victim by some bait to the treacherous spot, stood armed with his good sword across the pitfall.

"At once with hope and fear his heart abounds."

"At length the gallant brute came trotting on his onward path, and, seeing the passage barred, rushed headlong on the vile pitfall. * * * The seal of Roger de Ferrie still remains in the Treasury at Durham, exhibiting his old antagonist, a boar passant."*

Many other traces of the existence of this formidable animal might be cited, and its head appears to have been a common dish with our ancestors.

The date of its final disappearance is not recorded, but it

* Surtees, History of Durham, vol. iii., 284.

probably occurred long before the wolf ceased to exist in our district.

The bones of the animal, together with those of the wolf, have recently been discovered in Heathery Burn Cave, near Stanhope. (see Wolf, p. 118).

Tribe II. RUMINANTIA, *Cuvier*, (Pecora, *Linn.*)

Family, 1. BOVIDÆ.

1. BOS, *Linn.*

1. B. Taurus, *Pliny.* (*Bos Urus*, var. *Taurus*, *Cuvier.*)

Cattle. *Male*, Bull; *Female*, Cow; *Young*, Calf.

It is not our province here to describe the various breeds of domestic cattle, which are to be found in the two counties, nor can we hope to throw any new light on the question of the origin and descent of these races. Some observations, however, upon this interesting question will be found below.

2. Bos Taurus, β Scoticus, *Cuvier*, *Gray*, *&c.*

FIG. 2.

[Chillingham Bull; *Bos Taurus*, var. *Scoticus.*]

Our local mammalian fauna is honorably distinguished from that of nearly every other part of the kingdom by the possession of this noble animal in a state of wildness. For although great difference of opinion exists on the subject we are inclined to think that the mass of evidence is in favour of the opinion that

the wild cattle of Chillingham are the descendants of those which roamed our hills when the beaver built its dams on our rivers, and the bear and the wolf preyed upon the Roe deer in our forests. We are aware that Professor Owen is not of this opinion, but believes that the Chillingham cattle are the descendants of the domesticated breed introduced into this country by the Romans.

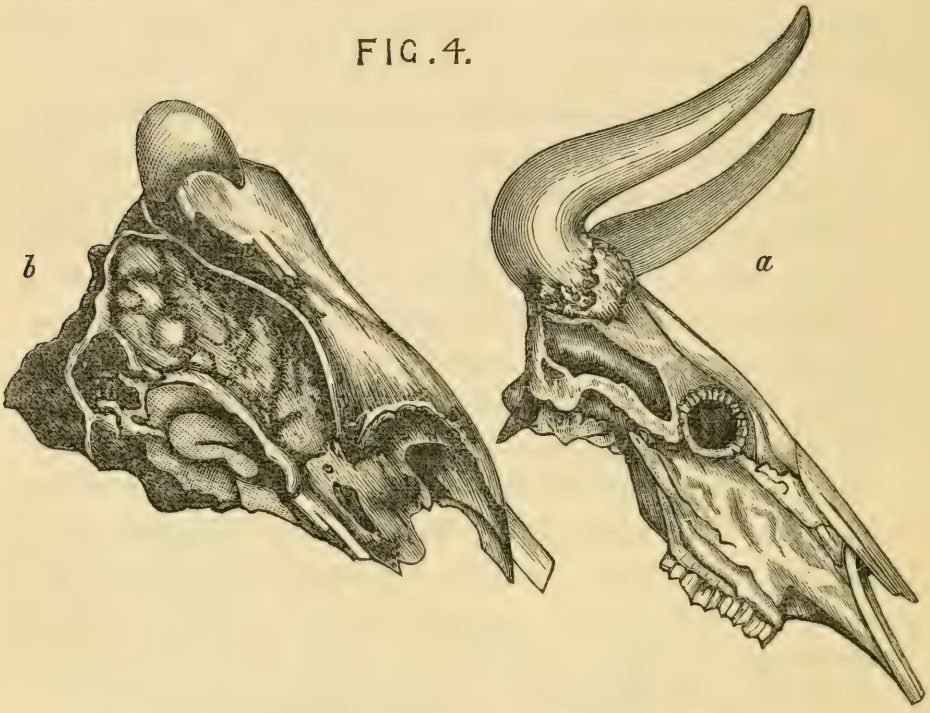
The Highland Kyloes and the Welsh Runts he considers are more probably the descendants of the cattle possessed by the Britons at the time of the Roman invasion, inhabiting as they still do the mountain fastnesses to which the Celtic population retired, and these were, he thinks, the descendants of a wild British race, probably, identical with the *Bos longifrons*, whose remains occur in the new pliocene strata, in the brick earth deposits, drift gravels, and bone caves. Of small size, and not like the *Bos primigenius* possessed of too formidable powers, they would be readily reduced to domesticity by a savage people.* The Roman cattle from whence he derives the Chillingham race, and our larger domesticated breeds generally, are, he says, descendants of the Indian Brahmin cattle (*Bos Indicus*, *Linn.*) which were procured by the Romans from the Greeks, by the Greeks from the Egyptians, and by these from India, probably through the intervention of the Syrians or Persians.† This is, we think, rather an elaborate and complicated theory to account for the existence of wild cattle at Chillingham. The *Bos Indicus* is usually held to be a distinct species, from *Bos Taurus*, and if the Kyloes and other British races descend from the latter, we have at once the long sought for proof of the continued fertility of hybrid races. Professor Owen considers that there is a marked tendency in the Chillingham cattle to revert to the characteristic dewlap of the Indian or Brahmin cattle, and that there are even signs of a rudimentary hump as well as other resemblances. On the other hand, M. Rütimeyer, an eminent authority, in a treatise on the remains found among the "Lake Habitations" of Switzerland, and on the origin of the present Swiss breeds, states it to

* Annals Nat. Hist. (1856) vol. xviii, 64.

† Professor Owen, Lecture at Newcastle, 1861.

be his opinion that "besides the two wild European species of Bos, the Urus (*B. primigenius*), and the Aurochs (*B. bison*), three *domestic* races of oxen occur in the Swiss Lake Habitations." The first of these (he considers) is allied to the Urus, and he there-

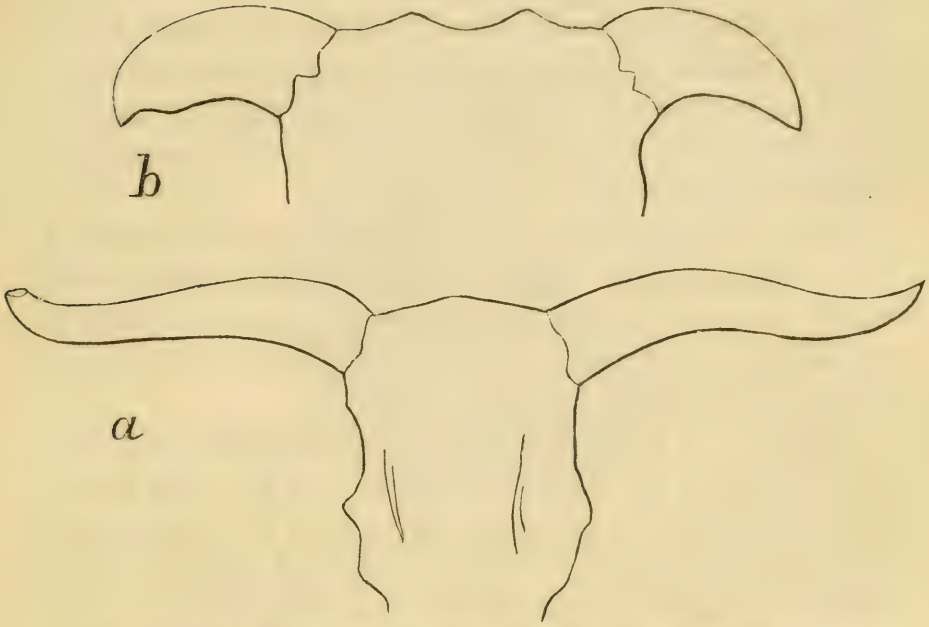
FIG. 4.



Figs. 4 & 5. Skulls of *B. primigenius* (a), *B. longifrons* (b), after Owen.

fore calls it the "*primigenius*" race. This occurs in all the Pile works of the Stone period. The second, or *Trochoceros* race, he correlates with a fossil species from the Diluvium of Arezzo and Siena, described under that name by F. von Meyer. The third, or *longifrons* race, is by far the most common of the three. Turning to the examination of the present European races of oxen, he considers that the old *Trochoceros* race is extinct, but he sees in the great cattle of Friesland and Holstein the descendants of the *primigenius* race. This large race does not now occur in Switzerland, but there are still in that country two distinct varieties of domestic cattle. The first, of various shades of colour but without spots, prevailing in the whole country south of a line drawn from Lake Constance to Wallis, agrees in its general osteological characters with the *longifrons* of Owen.

FIG. 5.



The second, or spotted variety, generally of smaller size, and predominating in Northern Switzerland, appears to agree with *B. frontosus*, a species found fossil in Sweden, and described by Nilsson.*

If the conjectures of Rütimeyer be correct, we too must see in our domestic races a kindred origin. Our spotless, uniformly-coloured Chillingham cattle may, like the Swiss race, be descended from *Bos longifrons*, and we can affirm from personal observation that the dewlaps of the Swiss cattle are even more highly developed than in the Chillingham breed, a character on which Professor Owen mainly rests his Brahminical theory. Our indigenous kyloes and runts, *smaller* in size, and frequently spotted, we may assign, perhaps, to *B. frontosus*, which appears to be a northern species.

Dr. Gray and many other writers agree in affirming the indigenous origin, and unbroken feral descent of the Chillingham cattle, and in identifying them with *Bos Scoticus*, the white Urus of Scotland, and the *Bisontes Jubati* of Boethius.†

* Natural History Review, January, 1862.
Trans. Antiq. Soc. Zurich, 1860.
Die Fauna der Pfahlbauten in der Schweiz.—Rütimeyer.

† Gray's Catalogue Mammalia, Brit. Mus.

It is recorded by Hollingshed in his description of Britain, that the Romans preferred the cattle of Britain to those of Liguria; it is therefore scarcely probable that they would import these to supplant a race which they deemed superior, and if we take into consideration the difficulty of transporting large numbers of cattle with the naval resources of that day, we increase our doubts on the subject.

Cæsar also specially mentions the herds of cattle possessed by the Britains at the time of the Conquest, in a manner which clearly shows that he considered that they enhanced the value of the newly annexed territory. So much for the Indo-Roman origin of the Chillingham cattle.

Strong, direct evidence in favour of the truly wild and indigenous origin of the Chillingham cattle is to be found in the wide distribution of a precisely similar race in this country, and in the unmistakeable testimony of history and tradition to the existence of such wild cattle at all periods of our history.

The following enumeration of the places at which wild cattle possessing all the peculiarities of the Chillingham race are known to have existed within very recent times affords, we think, strong presumptive evidence of their pure descent from a common wild stock.

To begin with the wild cattle of Scotland, Pennant says,* "About two hundred and fifty years ago there was found in Scotland a wild race of cattle which were of a pure white colour, and had (if we may credit Boethius) manes like lions. I cannot but give credit to the relation, having seen in the woods of Drumlanrig and in the park belonging to Chillingham Castle herds of cattle probably derived from the savage breed. They have lost their manes, but retain their colour and fierceness. They are of middle size, long leg'd, with black muzzles and ears; their horns fine, with a bold and elegant bend. * * * The weight of the ox is thirty-eight stones, of the cow twenty-eight. * * * These cattle are as wild as any deer. * * * Frequent mention is made of our savage cattle by historians. One relates that Robert Bruce was saved by the intrepidity of

* Pennant, British Zoology, I., 25.

one of his courtiers (hence called Turnbull) from the rage of a wild bull. Fitz Stephen (temp. Henric II.) calls those in the

FIG. 3.

forests round London *Uri sylvestres*. Among the provisions at the great feast of Nevil Archbishop of York were six wild bulls. Sibbald assures us that in his days a wild white species was found in the mountains of Scotland. Bishop Leslie says, in his time (1598) cattle in a wild state were found in Sterling, Cummernald, and Kincairn."

With regard to the above extracts, we need only observe that Boethius probably exaggerates the fierceness of the race, and draws a little upon his imagination for the lion-like manes, of which, however, the Chillingham breed show some trace. Boethius' description, as given by Hollinshed, is as follows:—"In this (Great Caledon) wood were sometime white buls (*candidissimo*) with shackt heares (*jubam densam*) and curled manes like fierce lions, otherwise they were like unto the tame, nevertheless so wild and savage that they would never be made familiar, nor tast of any hearbe or grasse that man's hand had once touched, after many daies. Being taken also by the industrie of man (which was very bad to doo) they would refuse all sustenance, and starve themselves to death. As soon as any did invade them, they would rush upon him with great violence and beare him to the earth; as for dogs, nets, or any kind of weapon, they feared not, neither cared they for any manner of engine. They

be found now onlie in Comerland (Cummernald)."* In the time of Boethius, however, the wild Caledonian cattle were greatly reduced in numbers by general slaughter; and at the dissolution of the monasteries, it is said that the remnant was removed to Drumlanrig. These lived there till 1780, and had no manes such as those described by Boethius; hence the reduced manes of the Chillingham cattle is no argument against their Caledonian origin, seeing that the purely descended Drumlanrig cattle were like them in this respect. The Drumlanrig cattle were swept off by distemper in 1780. Besides these, there were others at Chatelherault, which still exist, but are considerably degenerated.

To turn now to England, we find in Matthew Paris' account of Leofstan† mention made of *Tauri sylvestres*, which, with many other wild animals, abounded in the forests of the Chiltern district of Bucks and Herts. It was here that the Saxon chieftains held out long against the Norman, and maintained the right of hunting for many subsequent centuries.‡

Hollinshed tells us that he has "read of wild bores and bulles to have been about Blackleigh neere Manchester, whither the saide prince (Henrie I.) would now and then resorte for his solace in this behalfe."

A manuscript in the possession of Sir Philip Grey Egerton, entitled "The Seconde Yeare's Travell thorow Scotland and Ireland, 1635," proves that there were wild white cattle in the park at Bishop Auckland at that time. The writer passed some days "att Bishoppe Auckland with Dr. Moreton, Bishoppe of Durham, who maintains great hospitalitie in an orderly, well governed house, and is a verye worthy reverend Bishoppe;" after describing the palace and "chapples," he says he saw "a daintie stately parke wherein were wild bulls and kine, wch had two calves runers; there are about twenty wild beasts, all white, will nott endure yo'r approach, butt if they bee enraged or distressed, verye violent and furious, their calves will bee wondrous fatt."§

* Hollinshed Chronicle, vol. v., p. 12.
† Vitæ Sancti Abbati Albanum, p. 45.
‡ Hollinshed Description of England, edit. 1607. p. 251.
§ Ann. Nat. Hist. III (1839), p. 241.

At Burton Constable in Yorkshire, a herd existed up to the close of the last century when they perished, like those at Drumlanrig, of distemper.

But there still exist herds closely resembling those at Chillingham, at Gisburne in Craven, Yorkshire, the seat of Lord Ribblesdale; at Lyme Park in Cheshire, and at Chartley Park in Staffordshire, the seat of Lord Ferrers. Of the last we are able to quote an excellent description. "A still nobler animal than the stag exists in this county, and in its wild state. The wild ox formerly roamed over Needwood Forest, and in the thirteenth century William de Ferrariis caused the park of Chartley to be separated from the forest, and the turf of this extensive enclosure still remains almost in its primitive state. Here a herd of wild cattle has been preserved down to the present day, and they retain their wild characteristics like those at Chillingham. They are cream coloured, with black muzzles and ears, their fine sharp horns are tipped with black. They are not easily approached, but are harmless unless molested."*

Figs. 6 & 7. Skull of Chillingham Cattle.

It will be seen that these cattle, and, we believe, most of the other wild herds have the tips of the ears, muzzle, and tail black. It is said that at Chillingham this also was the case with many of the cattle, but that these were shot off by the keepers, and thus the peculiarity was in time eliminated. This was, we

* Garner's Nat. Hist. of Staffordshire, 1844, p. 249.

think, injudicious, the black tips being no proof of impurity, but distinctive marks of the ancient cattle of the Caledonian forest which formerly covered nearly all Northumberland.

In Cornwall, and the south-west of England, the wild cattle were called black cattle* from their dark colour, these, therefore, would appear to have been of a different race.

We must now turn to the more immediate subject of the Chillingham race.

The park of Chillingham is very ancient, old documents mention it in the reign of King John, about 1226; but still there is little documentary evidence of any antiquity specially relating to the cattle. The park is no doubt on the site of the ancient Caledonian forest. The Chillingham cattle have many of the characteristics of a wild race: they hide their young, feed at night, basking or sleeping during the day, are fierce when pressed, but generally speaking very timorous, and have a peculiar faculty, like the red deer, of taking advantage of the irregularities of the ground, so that when disturbed they will traverse the park without coming in sight. They have a peculiar wild cry, are beautifully shaped, their horns are of very fine texture, and their skin thin. They differ from the domestic breed in the form and direction of the horns, and in the bulls having a short rudimentary mane and some hair on the breast.† ‡

2. CAPRA, *Linn.* (HIRCUS, *Wagner.*)

1. C. HIRCUS, *Linn.* GOAT.

Hircus Ægagrus, Gmelin.

This animal is probably not indigenous in these islands, the *Ægagrus* of the Caucasus and Persia being generally supposed to be the parent stock. In the mountains of Wales, however, it has recovered its original freedom, and even in the hilly districts of Coquetdale, and especially near Rothbury, considerable flocks may be seen in a state of semi-wildness. Formerly many invalids resorted thither to drink the nutritious milk which they

* Couch, Fauna of Cornwall.

† Earl of Tankerville's letters to Mr. J. Hindmarsh and Mr. Children. Eighth Report of the Brit. Assoc., 1838.

‡ Bell Brit. Quad., 423.

furnished; the invalids still go there in greater numbers than ever, but the milk is, we think, now little used.

3. OVIS, *Linn.*

1. O. ARIES, *Linn.* SHEEP. RAM. EWE. LAMB.

Ægroceros aries, Pallas; *Capra ovis*, Blumenb.; *Ovis rusticus*, Linn.=Common Sheep; *Ovis Anglicana*, Linn.=Hornless (Lincolnshire) Sheep; *Ovis hispanica*, Linn.=Merino (middle-woolled) Sheep.

This animal, also, is not indigenous to these islands. Its parentage is generally referred to the *Mouflon* or *Musmon* of Corsica and Sardinia, or to the *Argali* of Asia, both, perhaps, divergent races from one common stock.

Among the breeds of sheep common or peculiar to Northumberland, are the black-faced heather sheep, a hardy mountain race, agile and active, producing fine high-flavoured moor-mutton. They are, however, small in size, and the wool is coarse and shaggy; hence they are fast being displaced by the Cheviots, a breed equally hardy, but producing a heavy carcase and fine wool, and whose improvement, and consequent high reputation and rapid diffusion, is a matter of just pride to the Northumberland breeders. They are now acknowledged to be the breed best adapted for the exposed grassy fells and moorlands of the north of England, the south of Scotland, and Sutherlandshire, and have consequently been generally adopted by the stock farmers of these districts.

Bewick, who is eloquent in praise of this breed, and of the skill of his countrymen in improving it, says, "they thrive on the most sterile heaths, their wool is of the most desirable texture, they are easily fattened, and their whole conformation is so properly suited to mountainous pastures, that we are surprised the breed has not already been more generally diffused."

The little mountain breed first noticed are probably the representatives of the earliest domesticated race in these islands, much resembling those of Wales and other wild districts to which the Celtic population retired before the Norman and Saxon

invaders. They may perhaps be looked upon as the descendants of those which pastured on the Cheviots when Greaves Ash was a busy town, and the camps of Brough Law and the surrounding hills were something more than mere objects of interest to the antiquary.

M. Rütimeyer considers it probable that our domestic sheep are the descendants of several wild races, perhaps brought into Europe by successful invaders and settlers on its soil.

The Teeswater breed, which was formerly considered the largest and heaviest of heavy breeds, is now almost altogether lost in the Leicester breed; and, indeed, the persevering efforts of intelligent and eminent breeders are being directed in so many quarters to the discovery of elements of improvement, that the old local and provincial breeds are everywhere fast disappearing.

Fam. CERVIDÆ. *Smith.*

I. CERVUS. *Linn.*

I. C. elaphus. *Linn.* Red Deer. Stag. Hart. Hind.

Although this splendid denizen of our forests and mountains has probably ceased to occur in a truly wild state in our district, it is but a very short time since such was the case, and it is still far from impossible that a stray stag may occasionally wander from the herds which are yet to be found in some of the wilder parts of Cumberland and Westmoreland, on to the neighbouring fells which are within our borders.

In the forest of Knarsdale, near Alston, they were to be found down to the close of the last century and probably in the early part of the present one.

Wallis writing of this animal, says, "the most beautiful of all our wild gregarious animals is the red deer, become very scarce by the eager pursuit of sportsmen and others after them. They are but seldom seen except in the forest of Knarsdale, where I have seen about five or six in company, never more. The moment they behold any of the human species they are struck with terror, and fly like lightning to some secure and experienced retreat for refuge."*

* Wallis' Hist. North. I., 408.

All the forests of Northumberland were formerly well stocked with deer, and these forests embraced a large portion of the county. They were Cheviot, Rothbury, Reedsdale, Eresdon (near Longhorsley), Lowes (from the lakes or loughs in it), Allendale, and Knarsdale.

In the fourth year of King Henry VIII., (1512), the forests of the Earl of Northumberland, in that county alone, contained 6000 head of deer; red, roe, and fallow. There were also at that time red deer in the forest of Rothbury.

The investigation of the boundaries and former condition of the forests of the county; the dates when they were disforested, and any records of the animals that inhabited them, would be an interesting study for some of our members, and an excellent subject for a paper. It is not to be supposed that these forests were densely wooded; they were probably then, as many of them are now, chiefly moorland, rock, and heather; indeed Leland, in his itinerary,* says "in Northumberland as *I heare saye*, be no forests except Chivet Hills, where is much brushe wood and some oake. Grownd ovar growne with Linge and some with Mosse. I have *hard say* that Chivet Hills stretchethe xx miles. There is greate plenty of redd Dere and Roo Bukkes." This was in 1538.

In the forests of Weardale, in the neighbourhood of Durham, and further eastward to the sea-coast, we have abundant evidence of the former existence of deer in great plenty.

Leland, writing at the date just given, says, "there resorte many redde dere, stragelers, to the mountains of Weredale." Froissart, speaking of the pursuit of the Scots by the army of Edward III. in 1327, says of their march from Durham that "whan they had thus ron forth often tymes in the day, the space of harfe a myle together towards the crye, wenying it had been theyr ennemyes, they were deceived, for the crye ever arose by the reysing of *hartis*, *hyndis*, and other savage beastis."

And Hartlepool is called by Bede Heoprea or Heopru, the place where harts drink; here, therefore, deer probably abounded, and the town-seal, a stag in a pool, perpetuates this derivation of the name.

* Vol. VII. pt. I. 66, edit. 1799.

The abundant remains found in our bogs and peat beds are all evidence of its former wide and plentiful distribution.

II. DAMA, *H. Smith.*

1. D. VULGARIS, *Gesner.* FALLOW DEER.

Cervus dama, Linn.

In our parks, but not indigenous.

III. CAPREOLUS, *Gray*,

1. C. CAPRÆA, *Gray.* ROEDEER.

Cervus capreolus, Linn.

This beautiful little deer is, like the Red, now no longer an inhabitant of our counties—like the Red-deer, also, it was once abundant on our own hills, as Leland and Wallis record. The former saying that "in the Chivet Hills were greate plenty of Roo Bukkes;" and the latter that about the same time the forests of the Earls of Northumberland abounded with them. It doubtless was to be found long after this time, but we have not been able to fix the date of its disappearance. It, however, probably disappeared long before the red-deer, which we have only lost in the present century.

One exceptional instance of its occurrence wild, in our district, is thus recorded by Bewick:—"Some years ago, one of these animals, after being hunted out of Scotland, through Cumberland, and various parts of the North of England, took refuge in the woody recesses bordering upon the banks of the Tyne between Prudhoe Castle and Wylam. It was repeatedly seen and hunted, but no dogs were equal to its speed: it frequently crossed the river, and, either by swiftness or artifice, eluded all its pursuers. It happened during the rigour of a severe winter, that, being pursued, it crossed the river upon the ice with some difficulty, and being much strained, was taken alive. It was kept for some weeks in the house, and was then again turned out, but all its cunning and activity were gone; it seemed to have forgotten the places of its former retreat, and after running some time, it laid down in the midst of a brook, where it was killed by the dogs."

Bones of this animal have been found with those of the wolf, and other species, in the Heathery-burn Cave, near Stanhope.

Order II. PERISSODACTYLA, *Owen.*

Tribe I. SOLIDUNGULA, *Ray.*

Family I. EQUIDÆ.

I. EQUUS, *Linn.*

1. E. caballus, *Linn.* Horse.

Although our district is not so famous as many for the breeding of horses, the southern portion of the county of Durham shares with the opposite banks of the Tees the credit of producing the valuable Cleveland breed, from which so many of the best carriage horses are derived.

Racing has had many ardent disciples among the nobility and gentry of the two counties, and many famous horses have illustrated their studs. We cannot pretend to enter at length into this branch of the subject, but many familiar names will at once occur to the reader, and the enormous gatherings which the Race Course at Newcastle annually sees assembled bear testimony to the great popularity of the sport among all classes.

The great number and value of the horses employed underground in our collieries is an interesting and peculiar feature of our district; and the excellent condition of these, is not only creditable to the men who have charge of them, but appears to show that this unnatural mode of life is not in any way detrimental to the animals themselves.

II. ASINUS, *Gray.*

1. A. vulgaris, *Gray.* Ass. Donkey. Cuddy (Loc. name).

Equus Asinus, Linn.

Plentiful throughout the district.

Although Hollinshed states that there were none of this useful animal in England in the reign of Queen Elizabeth, it is quite certain that this was, if correct, an exceptional event, for the ass was introduced into this country at least as early as the reign of Ethelred.

Section III. MUTILATA, *Owen.*

Order I. CETACEA=CETE, *Cuvier.*

Family I. DELPHINIDÆ, *Gray.*

I. PHOCÆNA, *Rondel.*

1. P. communis, *Lesson.* Porpoise=Porpesse=Porc-poisson. Hog-fish. Sea-hog.

Phocæna communis, Gray (Cat. Cet. 81), *Delphinus phocæna*, Linn.

This species is abundant in our seas, associated in small herds, and it may often be seen pursuing its grotesque gambols on the surface of the water, especially during the herring season Wallis says, "the lesser porpess is frequent under the promontories and in the deep bays upon the sea coast, many of them sporting sometimes together on the surface of the waves, rolling and rumbling like a parcel of swine, hence it is generally called a sea swine. The sand eel is its favourite food."

Sir Cuthbert Sharp also mentions the "Porpesse" in his list of "Cetaceous Animals" found at Hartlepool.

We have seen it abundantly off nearly every part of our coast.

Down to the reign of Queen Elizabeth, the flesh of this animal was highly esteemed, and formed an important dish on state occasions.

II. ORCA, *Rondel.*

1. O. gladiator, *Bonnat.* Grampus (Grand poisson). Great porpesse. Ork. Killer. Bottle nose.

Orca gladiator, Gray (Cat. Cet. 92); *Delphinus orca*, Linn; *Phocæna orca*, Wagler.

This species is not uncommon off our coast, although it is much less frequently seen, and not so numerous as the foregoing.

Wallis says, "the Grampus, Bottle Nose, or Great Porpess is sometimes observed on our coast; sixty-three of them came on shore at Shoreston, 29th July, 1734, about noon, sixty of which were between 14 and 19 feet long, and the other three about 8 feet. They were all alive when they came on shore, and made a hideous noise, but were soon killed by the country people, who

removed them one by one with six oxen and two horses, and made £10 by their blubber." In this instance the animals most probably belonged to the next species, the Ca'ing or Howling Whale, which is frequently driven on shore in large herds, and makes a great noise when attacked.

Sir Cuthbert Sharp includes the Grampus in his list of Hartlepool Cetaceans.

This animal is the most voracious and destructive of all the Cetacea, whence its English name of "Killer."

M. Van Beneden, in an address to the Belgian Academy on the Whales of the Antwerp Crag, and the recent Cetacea of the Belgian coast, gives the following extraordinary account of its habits:—

"The Ork is by far the most formidable of all the great marine animals; the colossal whale, even, is not exempt from his formidable attacks; it is truly the consternation of all. Nothing is more curious than to listen to the tales of the fishermen of Greenland and Spitzbergen of the habits of these marine monsters. What violence in the struggle, what tenacity in the attack! One would think one was listening to the recitals of travellers in the deserts of Africa narrating the gigantic struggles of the great mammifers, the terrible assaults made by the lions and tigers on the elephants, the buffaloes, or the antelopes. The 1st of August of this year (1861), a fine male lost itself on the coast of Jutland. Intelligence was sent immediately to Copenhagen, and Professor Eschricht made his way to the place. He wished to know, above all, on what this animal had fed during its last hours; and he soon discovered that, not without reason, the Ork is the terror of the seas. Its stomach contained (one would scarcely have believed it possible) thirteen porpoises and fifteen seals! My learned friend searched with a feeling of horror whether, amongst this frightful mass of victims, he could not find the remains of a sailor."

During the recent dredging expedition off the Northumberland coast, when at work about twenty miles east of Berwick, we witnessed with much interest the gambols of many of this species, some of them of large size, which approached within a few yards

of our steamboat, and were no doubt attracted to the spot by the number of porpoises and other foes of the herring which the abundance of their favourite food had drawn together.

III. GLOBIOCEPHALUS, *Lésson.*

1. G. SVINEVAL, *Lacep.* CA'ING WHALE. ROUND-HEADED PORPOISE. PILOT WHALE. BLACK WHALE. HOWLING WHALE. SOCIAL WHALE.

Globiocephalus svineval, Gray (Cat. Cet. 87); *Phocæna melas*, Bell.

This species, which attains to a length of 19 or 20 feet, is occasionally met with on our coast in large herds. These herds are always piloted about by a leader (whence the name of Pilot whale), and if this leader should chance to run on shore, they all blindly follow him to their destruction. We have little doubt that Wallis's account of the herd stranded at Shoreston refers to this species.

Mr. George Tate records the destruction of another large herd at Howick Burn mouth, on the Northumberland coast, in the Proceedings of the Berwickshire Club, Vol. III. p. 176.

IV. HYPEROODON, *Lacep.*

1. H. BUTZKOPF, *Lacep.* BOTTLE-HEAD. BEAKED WHALE.

Hyperoodon Butzkopf, Gray (Cat. Cet. 63).

We are not able to record any recent instance of the capture of this species on our coast, and can therefore only place it in our catalogue on the ground of the discovery of a skeleton in the bed of the Tyne near Newcastle. For a full account of these remains, and of the arguments in favour of the whale when in life having wandered to the spot where it was found, to die there, we must refer our readers to a very interesting paper by Dr. Embleton in our Transactions, Vol. IV. p. 50.

2. H. LATIFRONS, *Gray.*

Hyperoodon latifrons, Gray (Cat. Cet. 70).

This fine species inhabits the North Sea, and has been seen on

most of the coasts washed by its waters. We have no actual instance recorded of the stranding of a specimen within our limits, but as a well known and widely distributed inhabitant of our seas, it does not seem safe to omit it.

In the Newcastle Museum there is preserved a very fine skull of an individual of this species, which was taken in Greenland by Captain Wareham.

V. CATODON, *Artedi.*

1. C. MACROCEPHALUS, *Lacep.* NORTHERN SPERM WHALE. CACHALOT.

Catodon macrocephalus, Gray (Cat. Cet. 49).

This extraordinary animal has been captured on our shores more than once.

Wallis thus records one instance. "A spermaceti whale was cast on shore about twenty years ago at Hauxley, near Warkworth. It was 54 feet long and 36 feet broad; the breadth of the tail 15 feet; the teeth, about 42, large, solid, and white, fixed in a double series in the lower jaw; the fistula or spout in the neck."

Another specimen of the same whale "was found dead at sea, about forty-four years ago," says Wallis, "by the fishermen of Cresswell, who towed it on shore; the jaw bone was sixteen feet long." In the grounds of Cresswell House, the seat of A. J. B. Cresswell, Esq., are still preserved many portions of the skeleton of this whale.

The atlas of another individual of this species was recently found by Edward Backhouse, Esq., buried at some depth in the sand near Seaton, but whether the deposit in which it was imbedded was of the same age as the sub-fossil peat deposits of the Tees mouth, or whether the bone belonged to a specimen stranded in historic times, we cannot say.

In the crypt beneath the library of the cathedral of Durham, many will have noticed the fragments of the skeleton of some huge animal. These are the remains of a young cachalot, stranded near Hartlepool, and sent to the Bishop of Durham, in the days when he claimed "Jura Regalia" within the limits of

the See. As these rights have ceased to exist for the last two centuries, the bones in question must have been deposited in the cathedral crypt at least two hundred years ago. The occiput, lower jaw (wanting the teeth), and a considerable portion of the upper part of the trunk are still perfect.

None of these specimens are, perhaps, so large as that described by Baker, in his Chronicle (p. 420); whose curious account we quote in his own words. "In the seventeenth year of Elizabeth a vast mighty whale was cast upon the Isle of Thanet in Kent; 20 ells long, and 13 foot broad from the belly to the backbone, and 11 foot between the eyes. One of his eyes being taken out of his head was more than a cart with six horses could draw. The oyle being boyled out of the head was Parmacittie."

VI. PHYSETER, *Linn.*

1. P. TURSIO, *Artedi.* HIGH-FINNED CACHALOT. BLACK FISH. MIZZEN MAST WHALE.

Physeter microps, Artedi; *P. tursio*, Gray (Cat. Cet. 56).

This whale, of which specimens have rarely, if ever, been examined by naturalists, has been seen on several occasions in the neighbourhood of the Dogger Bank, by persons on board vessels passing between this country and the Baltic.

The extraordinary size and prominence of its dorsal fin doubtless renders it a conspicuous object, but it is much to be desired that a specimen could be obtained, and subjected to a critical examination.

Sibbald's description of this whale is as follows:—"Habebat autem hæc bellua duas pinnas laterales, et tertiam in medio ferè dorso erectam quam arbori navis comparabat, quæ a nautis 'mizan-mast' dicitur."*

* Sibb, Phal. Nov. Cap. iv. p. 44.

Family II. BALÆNIDÆ.

I. BALÆNA, *Linn.*

1. B. MYSTICETUS, *Linn. S.N.* 1. 105. GREENLAND WHALE. RIGHT WHALE. WHALE-BONE WHALE. ROCK-NOSED WHALE.

Balæna mysticetus, Gray (Cat. Cet. 12); *B. grænlandica*, Linn.; *B. Rondeletii*, Willoughby.

This gigantic species we may claim as a very occasional visitant to our seas. Willoughby, in his curious old work, called the Ichthyologia (p. 37), records the capture of one at Tynemouth, and there is no doubt that other instances have occurred more recently. It is, however, much rarer in temperate seas than its still more gigantic congener, the Rorqual. We quote Willoughby's description† below:—

"Projecit in arenas apud *Tynemuthum* mare hoc nostrum mense Augusto anni 1532, mortuam belluam mollis et magnitudinis ingentissimæ quæ jam magna ex parte discerpta est; remanet tandem adhuc quantum centum ferme ingentia plaustra avehere vix potuerunt. Aiunt qui primum belluam viderunt et ubi poterant diligenter perscripserunt, longitudinis illam fuisse 30 ulnarum hoc est pedum 90. A ventre ad spinam dorsi quæ arenis profunde immersa jacet spatium esse circiter ipse ibi affui, fœtente jam bellua, ut vix ferri posset odor. Conjectant dorsum ipsius ad spatium trium ulnarum in arenam immersum; nam quotidie alluitur et operitur fluctibus maris. *Rictus* oris sex ulnæ et dimidia. Longitudo *mandibulæ* septem ulnæ cum dimidia circuitus alicubi ulna una cum dimidia; Triginta costas in lateribus habet magna ex parte longitudine pedum 21 circuitu $1\frac{1}{2}$."

II. MEGAPTERA. *Gray.*

1. M. LONGIMANA, *Rudolphi.* JOHNSTON'S HUMP-BACKED WHALE.

Balæna boops, Eschricht, (K. Danske Vind. Selskab Afh. 1845, ix. 239. Nord. Wallthier, 1849); *M. longimana*, Gray, (Cat. Cet. 26); Johnston Nat. Hist. Trans. I. 6.; *Megapteron boops*, Eschricht.

For an excellent description and figure of this species, we

† Willoughby Hist. Pisc. p. 37.

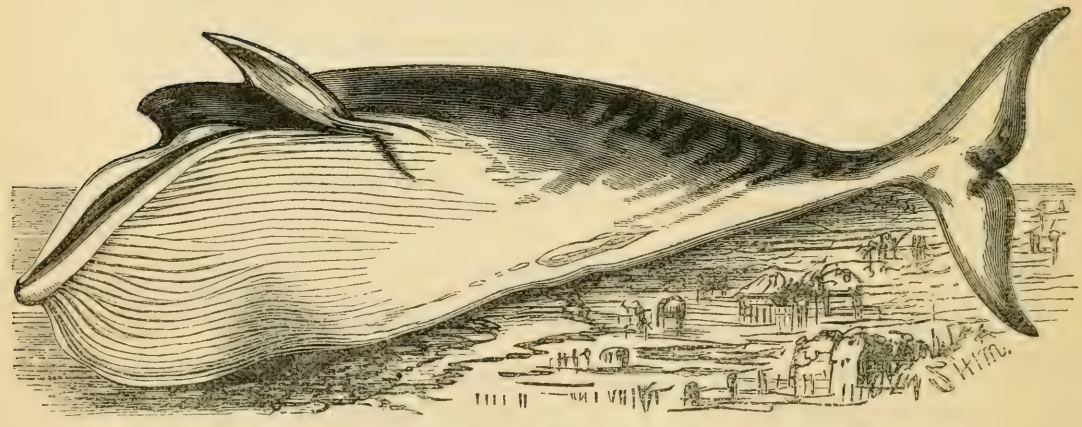
must refer the reader to a paper by Dr. Geo. Johnston, in the Transactions of the Nat. Hist. Soc. of Northumberland and Durham, vol. I. 6. The specimen from which the figure and description are drawn was taken at Berwick, in September, 1829. It was a female, and measured 35 or 36 feet in length and 24 feet in greatest circumference.

In this paper he says, "Whales of this description annually visit our coasts in the autumn; enticed from their proper residence in the north by the appearance of the herring fry, on which they chiefly prey. A few weeks previous to the above date, an individual, which measured 58 feet in length, was thrown on Holy Island; and a few years ago, another, considerably larger, was exhibited at Eyemouth. They afford little oil in proportion to their size, and their whalebone is short, so that the carcase is of little value. The one I have described, sold for £17 2s. 6d.

The blubber was firm, nearly four inches in thickness, and yielded, I have been informed, about eighteen gallons of very inferior oil.

On opening the stomach, six cormorants were found in it, and another in the throat, so that it was presumed that the whale was choked in the attempt to swallow the bird."

III. BALÆNOPTERA, *Lacep.*
(PTEROBALÆNA, *Eschricht.*)

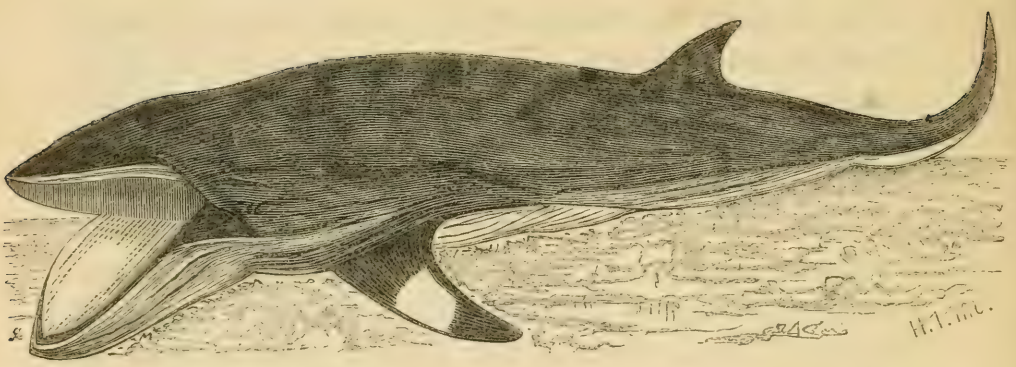


1. B. ROSTRATA, *Müller.* PIKE WHALE. FIN-BACKED WHALE.

Balænoptera rostrata; Hunter, Phil. Trans., vol. 77, p. 373, t. 20—23; Gray, Cat. Cet. 32; *B. Boops,* Albert. Icon. Anal. 1822; *Rorqualus Boops,* F. Cuv. Cet. 321.

This species is the smallest of the genus, seldom exceeding 25 or 30 feet in length. Hunter's description, in the Phil. Trans. referred to above, was drawn from a specimen 17 feet long, taken on the Dogger Bank. The figure which he gives is characteristic, but scarcely accurate in the proportion of some of the parts. We do not, however, rest our claim to include this fine animal in our Catalogue on this instance of its capture alone; for, on the 6th February, 1858, a whale was caught off the coast of Northumberland near Craster, which we have no hesitation in referring to this species. We are indebted to our friend, Mr. John Hancock, of Newcastle, not only for the accurate measurements given below, but still more for the use of his excellent drawings made from the animal when fresh. The great rarity of the species gives additional value to these data. The skull and baleen are now preserved in the Newcastle Museum.

Mr. Hancock's notes, copied verbatim, are as follows:—"Balænoptera Boops—caught 6th Feb., 1858. Total length from snout to posterior border of tail on median line, 16 feet; length from snout to anterior border of pectoral fin, 2 ft. 8½ in. Length from snout to posterior angle of the eyelids, 3 ft. 1 in. Base of pectoral fin, 13½ in. From snout to anterior margin of dorsal fin along dorsal ridge, 10 ft. 5 in. Base of dorsal fin, 12 in. Height or length of pectoral fin, 2 ft. 6 in. Breadth across the middle, 7½ in. Height of dorsal fin, 10 in. Breadth across the middle, 4 in. Length of caudal fin (tail), 14 in. Width posteriorly, 4 ft. 3½ in. Length of ventral surface from end of tail to posterior part of anal orifice, 4 ft. 2 in.; to posterior part of genital fissure, 5 ft. Length of genital fissure, 9 in. Length of anal fissure, 4½ in. Length of surface on which the plicæ exist, 7 ft. 5 in. laterally; on median line, 1 foot less Plicæ, fifty in number, each an inch wide, and flat on the surface. Eye oval, 2 inches across the long diameter; 1½ inches across the short diameter; length of lower jaw to immediately below the eye, 3 feet 7½ inches; width between posterior ends of jaw, 2 feet; from the blowhole to the snout, 2 feet 1 inch; blowhole, 6 inches long; number of plates of whalebone on the left side, 334.



For an account of the osteology of the Balænopteræ, a paper by Mr. Julian Deby, in the Zoologist, p. 1528, may be referred to.

IV. PHYSALUS, *Lacep.*

1. P. ANTIQUORUM, *Fischer.* RAZOR-BACK. RORQUAL.

P. antiquorum, Gray (Cat. Cet. 38); *Balænoptera musculus*, F. Cuv. (Cet. 327); *Balænoptera boops*, Yarrell (Zool. Proc. 1840).

This enormous animal fully equals, if it does not indeed exceed in bulk, the Greenland, or Right Whale. Specimens taken in this country have exceeded 100 feet in length, and one captured in 1831, near our own coast, measured 80 feet in length.

Its Norwegian name, Rohr-waale, from whence comes our Rorqual, signifies the "whale with folds," from the Plicæ on the anterior ventral surface.

SUB-CLASS II. LISSENCEPHALA, *Owen.*

ORDER 1. CHEIROPTERA, *Illig.*

TRIBE 1. INSECTIVORA, *Owen.*

FAMILY 1. VESPERTILIONIDÆ.

1. VESPERTILIO, *Linn.*

(Sub-Genus. PLECOTUS, *Geoffr.*)

1. V. AURITUS, *Linn.* LONG-EARED BAT.

Plecotus Auritus, Geoff.

This species is generally distributed and abundant in both Northumberland and Durham. "Twizell," *P. J. Selby, Esq.*

"The most common species about Darlington," *W. Backhouse.*
"Castle Eden," *Rev. H. B. Tristram.*

(Sub-Genus, VESPERTILIO, *Bonap.*)

2. V. NATTERERI, *Kuhl.* REDDISH-GREY BAT.

We can only record one instance of the capture of this species, but so little attention has been paid to the bats of our district that this and other species may probably be more generally distributed and less rare than is usually supposed.

"On a tree in Hoffal wood, Durham." "This species has only seven or eight transverse lines on the inter-femoral membrane," *W. Backhouse.*

3. V. DAUBENTONII, *Leisl.* DAUBENTON'S BAT.

"Darlington (Shotley Bridge?)" "This species has numerous transverse lines on the inter-femoral membrane, and six or seven parallel to the body, between the upper arm and the leg."—*W. Backhouse.*

"Auckland St. Andrew, Durham." A specimen of a white bat, taken in the church at this place, is preserved in the University Museum at Durham. Its colour is doubtless accidental, but from some apparent differences between it and *V. Daubentonii*, to which he stated it was nearly allied, the Rev. L. Jenyns, who examined it, was led to describe and figure it as a distinct species, under the name of *V. ædilis*, in the Ann. Nat. Hist. III. (1839) p. 75.

M. M. Keyserling and Blasius, however, pointed out that the characters of the supposed species were taken from those parts or organs most likely to be modified and distorted in dried and stuffed specimens, and that they were not sufficient to separate it from *V. Daubentonii*, with which the description and figure well agree (Wergmanns Archiv. Pt. I. 1840, and A. N. H., V. (1840) p. 149). In this opinion Mr. Jenyns fully concurs, and states that further examination has convinced him that it undoubtedly belongs to *V. Daubentonii*, of which it is merely a white variety. (A. N. H. VII. 1841, 262.)

4. V. DAUBENTONII, *Leis.* β NOTCH-EARED BAT.

V. emarginatus of many English authors.

To this variety belong most of the specimens of the Notch-eared Bat hitherto recorded in Great Britain under the name of *V. emarginatus*. The claim of that species to be considered a native of these islands is somewhat doubtful. (A. N. H. (1854) XIII.)

A single specimen of the Notch-eared Bat was caught at Long Benton, two years ago, and was taken to Mr. T. J. Bold, by whom it was carefully examined and compared with the figures and descriptions of Bell and M'Gillivray. It was, unfortunately, not preserved. Its ears were very large, their length considerably exceeding that of the head.

V. emarginatus is doubtfully included by Mr. Selby, in one edition of the Twizell Fauna.

5. V. MYSTACINUS, *Leisl.* WHISKERED BAT.

"Shotley Bridge (Darlington?)" *W. Backhouse.* "The lines on the inter-femoral membrane are numerous as in *V. Daubentonii*, but the parallel lines number twelve. It is altogether of a much darker colour, and smaller in nearly all respects."—*W. B.*

(Sub-Genus, PIPISTRELLUS, *Bonap.*)

6. V. SEROTINUS, *Schreb.* SEROTINE BAT.

V. noctula, Geoffr.; *Scotophilus serotinus*, Gray.

A fine specimen of this species is in the Museum of the Natural History Society at Newcastle. It was taken at Cleadon, in 1836, and presented to the Society by Mr. W. A. Swinburne.

Its large size, and the rich chesnut colour of the fur, render it a conspicuous and easily distinguishable species.

Its occurrence has hitherto only been recorded in the southern counties, and chiefly in the immediate neighbourhood of London.

7. V. PIPISTRELLUS, *Schreb.* COMMON BAT. PIPISTRELLE. FLITTERMOUSE. REREMOUSE. (*A. S. arœran.*)

"Twizell Fauna," *P. J. Selby.* "Darlington," *W. Backhouse.* "Castle Eden," *Rev. H. B. Tristram.*

Abundant throughout our district, and may be seen in almost every month of the year, if the weather be at all favourable.

The common bat of the Continent is *V. murinus*, which led many English writers to give that name to the *Pipistrelle.* The true *murinus* has as yet been met with, in England, only in the Gardens of the British Museum, a somewhat suspicious locality, as it may easily have been introduced accidentally in packing cases, or by design.

ORDER II. INSECTIVORA, *Owen.*

FAMILY I. TALPIDÆ.

I. TALPA, *Linn.*

1 T. VULGARIS, *Linn.* MOLE. MOULDIE-WARP.

T. europœa, Linn., Sys. Nat.

The common name of this little animal in the North of England is "Mouldie-warp;" a pure and scarcely modified Anglo-Saxon name, derived from *molde*, soil, and *weorpan*, to throw or turn up.

It is abundant everywhere in our district, and a cream-coloured variety is not unfrequently met with. Selby notices the capture of one at Twizell, and very recently Mr. Thomas Thompson has recorded, in the Zoologist, (Feb. 1862) the occurrence of two specimens at Winlaton. A white or silver grey variety, which appears to be less common, has also occurred at Twizell. A curious superstition prevails in the county of Durham, that the capture of a white mole upon a farm foretells the death of the head of the household. The Reverend G. C. Abbes tells us, in illustration of this, that "the son of a small farmer near Sunderland, himself a man of middle age, and tired of waiting for his inheritance, offered a considerable reward to the mole catcher if he could succeed in trapping a white mole on the farm; after some little time the man brought the desired

animal, and received the reward, accompanied with the following threat, "*Deil tak ye! if ye catch anither white mole on this farm I'll smash your heed!*" No wonder! for the next white mole would be the herald of the son's own end.

Family II. ERINACEIDÆ.

I. ERINACEUS, *Linn.*

1. E. europæus, *Linn.* Hedgehog. Urchin.

This animal is common throughout our district, in localities suited to its habits.

The old prejudice still prevails, that it robs the cow of its milk; an accusation which could not be better met than by the reply of a friend of ours to a farmer who made it. "Do you think," says he, "if you had a beard of prickles, like a hedgehog, the cows would let you suck them?" This seemed a new idea to the farmer, and left him at a loss for an answer.

There is no doubt that the eggs of game birds and others which nest upon the ground, may occasionally be destroyed by this animal, but the amount of injury is trifling, and does not justify the remorseless persecution to which it is too often subjected; and the damage, whatever its extent may be, is far more than compensated by the destruction of multitudes of grubs and snails.

Their partiality for insects makes them very serviceable in clearing houses of cockroaches; but the service is fatal to the poor hedgehog, which soon falls a victim to the indigestibility of the hard wing-cases of this insect pest. An ample supply of milk will, however, retard the catastrophe.

Family III. SORICIDÆ.

I. SOREX, *Linn.*

(Sub-Gen. Amphisorex, *Duvernoy.*)

1. S. hibernicus, *Jenyns*, A. N. H. VII., 263. Common shrew. Erd Srew. Fetid Shrew.

S. rusticus, Jenyns, A. N. H. vol. I., (1857) p. 421; *S. araneus*, (of Engl. authors) Jenyns, Man. Brit. Vert. 17, Bell, p. 109, Pennant, Brit. Zool. I., 125; *S. tetragonurus*, Geoffroy (not of Herm. and Duvernoy).

The characters of the sub-genus *Amphisorex* may be briefly stated, and will be found useful in distinguishing the common shrews of this country from the prevailing continental species, which belong to the genus *Crocidura*, and the teeth altogether white. "Teeth all more or less coloured at the tips; lateral incisors in the upper jaw, five, diminishing gradually in size from first to last."

The Rev. L. Jenyns was the first to separate this species from the *S. tetragonurus* of continental writers; from which, we think, it is specifically distinct; though the fact is not admitted by some. He first described certain Irish specimens under this name, and afterwards some English ones under the name of *S. rusticus*, failing, at the time, to perceive their identity, which he afterwards pointed out, and desired to give the latter name to the species; the name we adopt has, however, the priority, and has been generally used by subsequent writers; though the existence of the two has given rise to much confusion.

M. de Selys Longchamps has published an able criticism on this and the allied species in the Etudes de Micromammalogie, Paris, 1839, p. 39.

The commonest continental species is *Sorex* (*Crocidura*) *araneus*, hence most English authors prior to Jenyns gave this name to this, *our* commonest species, or rather to this and the next species which were not then discriminated.

The dentition is $\frac{2}{2}$ middle incisors; $\frac{5}{2}$, $\frac{5}{2}$ lateral incisors; $\frac{4}{3}$, $\frac{4}{3}$ molars; total $\frac{30}{32}$.

The English names and popular superstitions connected with this animal will be understood to include the two species.

The name, Shrew, like that of most of our common animals, is of Anglo-Saxon origin, being in that language *schreava*, from *schreadan*, to cut, or the analogous *scheorfian*, to bite or gnaw.

It is popularly believed that the shrew produces lameness by running over the feet of horses or men. The twigs of the shrew-ash are, however, an efficient remedy. It is also believed that it cannot cross a cart road, and that to pass over the track of a horse is fatal to it, hence the numbers which in some months are found lying dead on the roads. The true cause of this

mortality, which chiefly occurs in August, we think, deserves enquiry.

2. S. TETRAGONURUS, *Hermann.* SQUARE-TAILED SHREW.

2. *S. tetragonurus*, Duvernoy; *S. vulgaris*, Linn (?) *S. cuniculārius*, Bechst.; *S. constrictus*, Geof. (not Herm.) A. N. H. II. 43 and 339; do. (1840) p. 435, Mag. Z. and B. (1838) II. 24.

This species is larger and more robust than the foregoing, has a broader snout, much larger feet, especially the fore ones, and is, we think, in our district, as on the Continent, the commoner species. It affects more moist localities. The dentition is the same as in *S. hibernicus.*

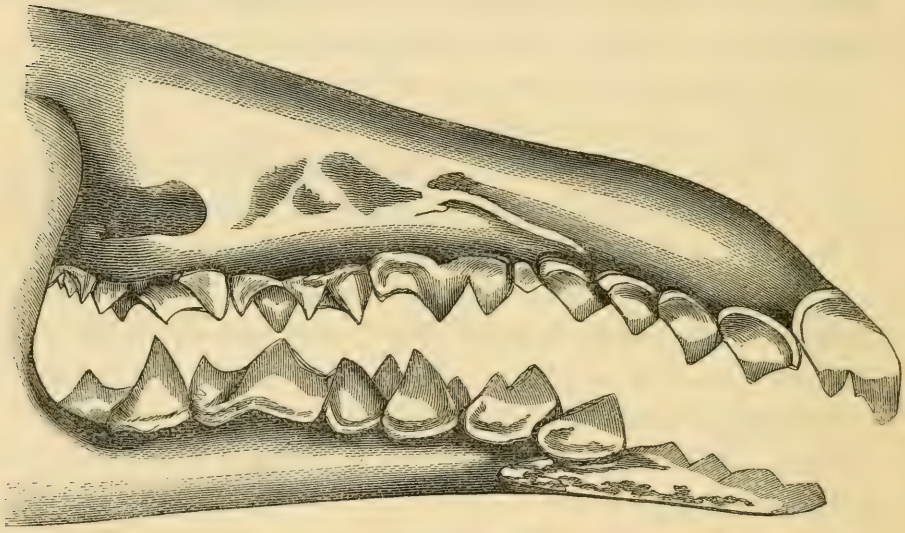


Fig. 8. Sorex tetragonurus, (Jaws of an adult male, magnified).—*H. T. M.*

The following dimensions, taken from a specimen we obtained in the neighbourhood of Newcastle, may be found useful:—Total length 4 in. 3½ lines; body 3 : 0; tail 1 : 3½; head 1 : 0¾; from tip of nose to eye 6 lines; from eye to lower corner of ear 3½ lines.

Two others which we have examined measured thus:—

Total length	4 in. 2 lines	4 in. 3 lines.
Head	0 „ 10 „	1 „ 0 „
Body	1 „ 10 „	1 „ 9 „
Tail	1 „ 6 „	1 „ 6 „

Both these were adult males, pale brown above, ashy grey below, the colours somewhat abruptly separated. The tail constricted at the base, quadrangular for two-thirds of its length, then flattened.

A chesnut-coloured variety was described by Mr. Jenyns as distinct, under the name of *S. castaneus*, but its specific distinction was afterwards abandoned (A. N. H., I. 424; II. 43; VII. 267).

S. tetragonurus is abundant everywhere in our district.

(Sub-Genus, HYDROSOREX, *Duvernoy.*)

3. S. fodiens, *Gmelin.* Water Shrew.

Sorex fodiens, Jenyns; *Man. Brit. Vert.* 18; A. N. H., I. 425; Bell, *Brit. Quad.* 115; Penn. *Brit. Zool.* I. 126; *S. bicolor*, Shaw; *Crossopus fodiens*, Wagler.

The sub-genus *Hydrosorex* is distinguished from *Amphisorex* by having only four lateral incisors in the upper jaw, of which the first two are equal, the third smaller, and the fourth, rudimentary, instead of presenting a gradually diminishing series. The tips of all the teeth are a little coloured.

The water-shrew is tolerably plentiful in both counties; "Cockerbeck, Darlington," *W. Backhouse*, "Castle Eden," *Rev. H. B. Tristram*, "Newcastle," *H. T. M.*, "Twizell," *P. J. Selby*, are localities widely apart, and sufficient to show its general distribution.

The dentition of this species is mid. inc. $\frac{2}{2}$; lat. inc. $\frac{4}{2}$, $\frac{4}{2}$; molars $\frac{4}{3}$, $\frac{4}{3}$; total $\frac{18}{12}$.

4. S. ciliatus, *Sowerby.* Oared Shrew.

S. remifer, Yarrell; Jenyns, *Man. Brit. Vert.* 18, A. N. H., I. 426. Bell, p. 119.

This species has generally been referred to the *S. remifer* of Continental authors, but the identification is extremely doubtful, the English species being much smaller than the true *remifer*.

Mr. Jenyns, in some of his communications on the species of this genus, doubts the specific difference of this from the last

species, but in other places he treats them as undoubtedly distinct. We can scarcely imagine a more perplexing study than the papers of Mr. Jenyns on this genus; the conclusions of each are invariably sapped by those of the next. We have not been able to give the attention we should desire to the subject, or to examine a sufficient number of specimens; but if opportunity offers, we shall probably return to the subject on a future occasion. In the mean time, the communication of specimens (which should be preserved in spirits) presenting any unusual features in size, colour, or otherwise, will be esteemed a favour.

For this species we can at present give only two localities, viz., "Shotley Bridge," *W. Backhouse;* "Castle Eden Dene," *Rev. H. B. Tristram.*

Its dentition is the same as that of *S. fodiens.*

Order III. RODENTIA, *Cuv.*

Tribe I. CLAVICULATA, *Owen.*

Family I. SCIURIDÆ.

I. SCIURUS, *Linn.*

1. S. VULGARIS, *Linn.* Squirrel.

Abundant in many parts of our district, especially about Riding Mill, Hexham, and Shotley Bridge, and in the woods north of Morpeth, but not by any means universally distributed.

The following notes have been kindly communicated to us by the gentlemen whose names are attached to each.

"The nests are plentiful in Ravensworth woods."—*G. S. Brady.*

"Very common here (St. John's), feeding on the cones of the fir, spruce, and larch, those of the Scotch fir they will eat green. I think they do not hybernate here, as they are to be seen about in winter, and their tracks on the snow are curious from their claws being so widely spread. I think they eat the *Boletus bovinus*, as I have seen them carry them into the trees, and I once found a dead frog in a squirrel's nest."—*W. Backhouse.*

"A squirrel shot near Hexham, in November, 1847, was of the usual colour, except that the mystachial bristles, the nose

and upper lip, the fore feet, two joints of the tarsi, the hind feet, and the whole of the claws were white. It had a band of white, about an inch in breadth, near the middle of the body, proceeding from the white of the belly, and nearly meeting on the back. The tail had also, towards the tip, a band of white two inches broad, which, when the tail was cocked over the back, coincided with the patches on the sides, and completed the band of white described above."—*Thos. J. Bold.*

"Castle Eden, once seen; Sedgefield, occasionally; City of Durham, occasionally."—*Rev. H. B. Tristram.*

"Appeared a few years ago at Matfen, Cheeseburn Grange, and Dissington."—*Rev. J. F. Bigge.*

II. MYOXUS, *Gmelin.*

1. M. AVELLANARIUS, *Linn.* DORMOUSE. SLEEPER.

Sciurus avellanarius, Erxleb.

This beautiful species is of rare occurrence in our district. It has been taken occasionally in the woods which clothe the valley of the Derwent, at Gibside, Winlaton Mill, and near Ebchester, (Trans. N. H. Soc., I., 335).

FAMILY II. MURIDÆ.

I. MUS, *Linn.*

1. M. MESSORIUS, *Shaw.* HARVEST MOUSE. NEST BUILDING MOUSE.

M. minutus, Pallas.

We have but few recorded localities for this species in our district, but among these, one is worthy of note from its great elevation; Mr. Wm. Backhouse has taken it at St. John's, Weardale, 800 feet above the level of the sea. (T. N. F. C., IV., 94.)

2. M. SYLVATICUS, *Linn.* LONG TAILED FIELD MOUSE.

This species is abundant throughout our district.

3. M. MUSCULUS, *Linn.* COMMON MOUSE.

In houses everywhere.

4. M. RATTUS, *Linn.* OLD ENGLISH OR BLACK RAT.

Our transactions contain a valuable and instructive paper, by Dr. Embleton, on the anatomy and structure of the black rat, as compared with that of the common species, T. N. F. C., II., 103. The specimens which were the subject of examination were obtained at Stockton, where, as in many other places in our district, the species still lingers, though in constantly diminishing numbers; and its disappearance is, probably, only a question of time. Papers, therefore, like that of Dr. Embleton, may some day have an interest similar to that which attaches to authentic and contemporary documents relating to the habits and appearance of the Dodo.

The substitution of one species for another is always interesting, and in this case many questions arise, difficult to answer satisfactorily. It is not easy to believe that the black rat was ever so widely, or generally distributed over the country as its rival now is, or it would surely have still held its ground in retired and isolated farms, houses, and hamlets.

On the contrary, it is actually met with in those places where the invading species landed, and where his forces were likely to be most numerous and powerful. In seaport towns, piers, and harbours, and in large cities, it is now chiefly, if not only, to be found; localities precisely the reverse of those we should naturally expect, had the species been at any time universally and abundantly distributed. Again the question arises whether in the short space of time which has elapsed since its reported introduction, the more powerful species could have spread itself in such vast numbers over every part of the country, even into the most distant and secluded spots?

Orthodox theories of historic and biblical chronology are based upon the supposed possibility of one parent stock peopling the earth, and applying the same kind of argument to an inferior race must we not throw back into a more distant past, the arrival in this English Eden of the first brown rat, the Adam of his race?

A century and a quarter ago, specific distinctions and differ-

ences were lightly regarded and little noted, and the brown rat may possibly, if not probably, have made much progress, and obtained a firm settlement before its presence was noticed. The remains of neither of the species of house rat have been detected, either in the "Kjökkenmöddings" of Denmark, or the "Pfahlbauten" of Switzerland, and the habitations of the ancient races of men, appear, therefore, to have been free from the troublesome invasion of these mischievous and destructive animals; nor, as we might expect, have any traces of the domestic cat been found among these early dwellings, for the mouse was also then absent from the habitations of men.

"This species used to inhabit my father's house in Darlington, living in the garrets, either from preference, or driven there by the brown rat."—*W. Backhouse.*

5. M. DECUMANUS, *Pall.* BROWN RAT. NORWEGIAN RAT.

This species is said to have been introduced into England in 1730. Though it is often called the Norwegian rat, it is probably of Eastern origin, and came to Europe by two lines of migration—one, proceeding north-west, towards the Baltic, the other, west, towards the Mediterranean; following in this respect precisely the same lines of march as those barbarian tribes who precipitated themselves upon the rich provinces of the Eastern Empire, and like the brown rats drove out the old possessors of the soil. In one hundred and thirty years, then, if the date be correct, has this wonderful animal, by fraud and force, combined with prolific multiplication, subjugated these islands, and indeed all Western Europe, and reduced to a few miserable fastnesses the ancient rat population of the country.

FAMILY III. CASTORIDÆ.

1. ARVICOLA, *Lacep.*

1. A. AMPHIBIUS, *Linn.* WATER RAT. WATER VOLE.

This species is abundant everywhere, about the banks of ditches, streams, ponds, and rivers. A piebald variety is noticed in the Berwickshire Proceedings, Vol. I. p. 104.

2. A. AGRESTIS, *Fleming*. FIELD VOLE. SHORT-TAILED FIELD MOUSE.

A. arvalis, Gmel.

This species is common throughout our district. A fine male which we obtained near Chollerford last year measured $5\frac{1}{2}$ inches in length.

A species closely allied to this, but exceeding it in size, was discovered by Mr. Thompson on the Perthshire and Inverness-shire moors, and described in the Ann. N. H., VII. p. 270, under the name of *A. neglecta*. It should be looked for on the moors and uplands of our district, where it is extremely likely to occur.

3. A. RIPARIA, *Yarrell*. BANK VOLE.

A. pratensis? Baillon; *A. rubidus?* Baillon (De Selys Longchamps).

As the synonymy of this species appears to be doubtful, we use Yarrell's name for it, although Baillon's has the priority. English writers refer it to his *A. pratensis;* Continental writers, however, place it under his *A. rubidus*.

Mr. Selby records the occurrence of this species at Twizell in the Mag. Zool. and Bot. 1838, Vol. II. p. 92.

Two specimens, male and female, were taken at the same time in a hang trap, baited with oatmeal, in the garden at Twizell. Dr. Johnston records its occurrence near Berwick, close to the borders (Proc. Berw. Club I. 24), and we have no doubt it is generally, though perhaps not abundantly, distributed over our district.

II. CASTOR, *Linn.*

1. C. FIBER, *Linn.* BEAVER.

Though long since extinct in our district, it was to be met with in our rivers quite within the historic period, and probably down to the time of Henry I., when it appears that an export duty of fourpence each on the skins of this animal was authorised to be levied at Newcastle-on-Tyne. (See a paper by Dr. Watson in Proc. Berw. Club. IV. 81.)

Remains of this interesting animal have been found in Linton Loch, and a skull is now preserved in the Museum of Kelso.

FAMILY IV. LEPORIDÆ.

I. LEPUS, *Linn.*

1. L. CUNICULUS, *Linn.* RABBIT. CONEY.

This species abounds everywhere in our district. The sand hills or links along our coast are an especially favourite locality, and at Bamborough and other similar places their numbers are prodigious. The Rev. H. B. Tristram informs us that the black variety is met with in Castle Eden Dene.

2. L. TIMIDUS, *Linn.* HARE. (*Scot.* MAUKIN.)

This species is still abundant in our district, in spite of the gloomy forebodings of Wallis, who in the following lines expresses sentiments which it should be among the chief objects of the Club to reduce to practice.

"Hares," says he, "have with us been as plentiful as in most countries, but they are like to be as scarce as the admired birds of our heaths, the Gor and Grey, unless our young sportsmen would have more regard to their preservation and their own pleasure. The consideration of their own healths, promoted by the exercise of the chace, should prevail with them, methinks, prudently to save, and not in a precipitate fury of desire to destroy an useful and innocent race of beings, intended by Providence to give us both food and pleasure, and some part of our ornamental and necessary clothing, for the pitiful and brutal ambition only of boasting among their companions of their killing their twenty, their thirty, or their forty brace in a season.

Savage and inhuman butchery; away with it from Northumberland. Let posterity enjoy the same blessings, so contributive to health, as our forefathers have done, with moderation."

It is well for this excellent man that he lived and wrote before the days of scientifically planned battues; words would have failed him to express his indignant horror at such cold-blooded butcheries and unsportsmanlike proceedings.

Cæsar, in the twelfth chapter of the book of his commentaries on the Gallican war, says that "the ancient Britons did not eat the flesh of the hare;" and evidently implies that they had some religious or superstitious scruple against eating the flesh of the hare, the cock, and the goose. Might not Cæsar be deceived by the Druids into this belief, or rather, may not the Druids, with the usual aristocratic sympathies of their class, have fostered this belief in the minds of the common people, so as to preserve for the upper classes of ancient British society, their rightful sport, of which they might soon have been deprived, had the lower orders once acquired a taste for such excellent viands. Coursing, cock fighting, and the snaring of wild fowl, were doubtless preserved to the country gentlemen and squires of that day, or those who represented them, by this excellent invention of the church, which caused, probably, much less heartburning and trouble than the game laws do in ours, and answered the same end.

This curious superstition appears to have existed among the earliest races of men, of which any remains are preserved. Neither in the "Kjökkenmöddings" of Denmark, or the "Pfahlbauten" of Switzerland have the bones of the hare been found.

3. L. VARIABILIS, *Pall.* ALPINE HARE.

L. hibernicus, Thomps.

There appears to be no doubt that the so called Irish hare is specifically identical with the Alpine hare of our mountains.

We are not aware that this species has been met with in our district, though we see no reason why it should not occur on the Cheviots and high fells which separate our counties from Cumberland and Westmoreland, the mountains of which it inhabits.

The Rev. H. B. Tristram tells us that an attempt was made to introduce it at Castle Eden, by Rowland Burdon, Esq., but that it was unsuccessful; all the individuals being destroyed and accounted for within a year.

*** Since our Catalogue was in type we have been favoured with much additional information, especially relating to Hounds and Hunting. This, with any further matter we are able to collect, may supply material for a supplement at some future time.

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XIII.—*Report of Dredging Operations on the Coasts of Northumberland and Durham, in July and August*, 1863. Edited by George S. Brady.

At the meeting of the British Association, at Cambridge, in 1862, a renewal of the previous year's grant was obtained for dredging the Dogger Bank, and the coasts of Northumberland and Durham. It was, however, found impossible to organize an expedition extensive enough to carry out the entire scheme; and under these circumstances the Committee entrusted to Mr. Hodge and myself a portion of the grant for use upon a more limited area. Our plan was to make Holy Island our head quarters, and from that point as a centre to dredge out, beginning at a moderate depth, into the deepest water that could be found off our coast, hoping by this means to include all possible depths and varieties of bottom. But, as will presently appear, our designs were frustrated by bad weather,—weather, bad at least for dredgers, though possibly good for every one else. On this exposed coast a brisk wind from any quarter raises the sea so quickly as to preclude all possibility of successful dredging.

Having engaged a suitable steam-tug,—the "Heather-bell," we started from Sunderland early on the morning of Monday, July 20th. There had been a long continuance of fine weather, and though the sea this morning was too rough to be pleasant, we were assured by all nautical and weather-wise people that the gale was over, and that we were going to have fine weather. About one o'clock, we reached the Fern Islands, and under their lee found for the first time water smooth enough to dredge in. The dredges were accordingly put down in about seventeen fathoms, and brought up several species of Mollusca, Crustacea, and Echinodermata, all of them well-known inhabitants of our coast. The water was not deep enough nor the bottom rough enough to reward us with anything very remarkable. The next day was equally unfavourable; the wind blew so strong, that on the open sea, there was no chance of keeping the dredges down; all we could do was to make the best use of our time in the sheltered water inside the Ferns. In the channel which separates

these islets from the mainland we cast over the dredges: here the bottom is very rocky and the tide runs excessively strong, so that without constant vigilance, there is great risk of losing the dredges. The worst that befel us this time was the bending of the blade of one, by fouling on a ledge of rock. Our most interesting captures on this ground were *Echinus neglectus*, and the little parasitic mollusc, *Stylifer Turtoni*. The former was remarkably fine and abundant, the dredges sometimes coming up almost filled with them. In the evening, the sea having somewhat fallen, we ran out to the haddock-ground, about six miles east of Holy Island, and here we spent the remainder of the day, but without making any very valuable additions to our list of captures. On Wednesday there was no improvement in the weather. We put down the dredges for a short time in Holy Island Harbour, thinking that on its sandy bottom we might find some *Ophiuræ* and *Diastylidæ*. In this we were unsuccessful, the only things which rewarded our search being two or three of the commoner species of *Crangon*. Probably the strong tide which sets through the harbour, and the shallowness of the water, may sufficiently explain the absence of much life here. Thoroughly disheartened with our ill success, we left Holy Island in the afternoon, with the intention of returning at once to Sunderland, but finding when we got outside that there was a smoother sea, we steamed out eastward for about ten miles and got an hour or two of very satisfactory work, in water of forty-six fathoms depth, with a rough, gravelly bottom. Here the dredges brought up a few specimens of *Ophiura squamosa* (Lütken), a pretty sand-star, not altogether new, but very imperfectly known in Britain; also, a single example of a beautiful nudibranchiate mollusc, new to Britain, *Hero formosa* (Loven), several interesting Crustacea, mostly of species obtained near the same locality last year, and a good many fine specimens of some of the mollusca characteristic of the district. On Thursday, as there was no prospect of any change for the better in the weather, we finally bade adieu to Holy Island.

With the hope of somewhat retrieving our fortunes we undertook, with consent of the Committee, a single day's dredging off

the Durham coast in the month of August. The result of this day's work was good as to Echinodermata, very poor in Mollusca, and no way remarkable in other respects. The Durham coast may be stated to be generally poor in Mollusca and rich in Echinodermata: of this latter class we took several specimens of *Brissus lyrifer*, *Spatangus purpureus*, and *Amphidotus roseus*; also *Luidia Sarsii*, *Uraster glacialis*, and *Amphidotus cordatus*; and among the *Holothuriadæ*, *Cucumaria elongata*, *Thyone fusus* and *T. Raphanus*. A few interesting zoophytes were taken which will be found noted in Mr. Alder's report.

On the whole, though our expedition cannot be called at all brilliantly successful, yet considering the uncertainty always attendant on dredging operations, there is not much ground for complaint. It has at all events proved to us that there is in the Holy Island district a field which under more favourable circumstances may be expected at some future time to yield rich results. Let us hope that when next our dredging proclivities take us to Holy Island, we may find it better meriting comparison with King Arthur's

> Island-valley of Avilion,
> Where falls not hail, or rain, or any snow,
> Nor ever wind blows loudly.

G. S. B.

Report on the Mollusca, by Joshua Alder.

On account of the unfavourable weather experienced in dredging, the number of species of Mollusca falls considerably short of what were got in the same localities in the previous year. The disparity is increased from the circumstance of no ground affording the more minute species having been met with. There is some difference in the abundance or variety of the species obtained, which proves that it is only by repeated dredging that a correct idea of their local distribution can be arrived at. The abundance of some of the northern forms, such as *Astarte compressa* and *Leda caudata*, shews the boreal character of this part of the coast, the fauna of which, upon the whole, approaches

more nearly to the Scandinavian than to that of the south of England. The most interesting animal met with was the *Hero formosa* of Lovén, a curious and beautiful nudibranch of a genus new to Britain, but occurring on the coasts of Norway and Sweden. It was dredged in 26 fathoms off Holy Island, and is a valuable addition to the British fauna. A specimen of *Stylifer Turtoni* was got in 15 fathoms within the Fern Islands. The rarity of this species is shewn by the fact that although numerous specimens of *Echinus esculentus* and *E. neglectus* were carefully searched, only a single *Stylifer* was obtained: it is usually found nestling among their spines, and, rare as it is on our coast, until lately, more specimens have been found here than in any other locality. The shells got in this year's dredging suggest nothing to add to the remarks of Mr. Mennell on their geological relations in last year's Report. The following species were obtained :—

MOLLUSCA.

	Off Holy Island.	*Durham Coast.*	
CEPHALOPODA.			
Sepiola Atlantica, *D'Orb.*	*r.*		This is probably the species named *S. Rondeletii* last year.
GASTEROPODA.			
Trophon clathratus, *Linn.*	*r.*		Dead shells.
Fusus gracilis, *Da Costa*	*r.c.*		
propinquus, *Alder*	*r.*		
antiquus, *Linn.*	*r.*		Small.
Buccinum undatum, *Linn.*	*r.c.*	*r.*	The stout Coralline zone variety.
Nassa incrassata, *Müll.*	*r.*		Dead.
Mangelia teres, *Forbes*	*r.*		Three or four dead specimens.
linearis, *Mont.*	*r.*		
Trevelyana, *Turt.*	*r.*	*r.*	
turricula, *Mont.*	*r.c.*		
Cypræa Europea, *Mont.*	*r.*		Dead.
Natica Alderi, *Forbes* (N. nitida, F. and H.)	*c.*	*r.c.*	
Natica Montagui, *For.*	*r.c.*		
Velutina lævigata, *Linn.*	*r.*	*r.*	
Trichotropis borealis, *Brod.*	*r.c.*		Three fine living specimens, the rest dead.
Stylifer Turtoni, *Flem.*	*r.*		One specimen.

	Off Holy Island.	*Durham Coast.*	
Aporrhais pes-pelicani, *Linn.*	*r.c.*	*r.c.*	
Turritella communis, *Risso*	*v.c.*	*v.c.*	A few of the white variety.
Scalaria Trevelyana, *Leach*	*r.c.*	*r.*	
Trochus cinerarius, *Linn.*	*r.*		Living in 40 fathoms.
millegranus, *Phil.*	*r.c.*		
Montagui, *Gray*	*r.*		Three dead.
tumidus, *Mont.*	*c.*		
ziziphinus, *Linn.*	*r.c.*	*r.*	A few of the white variety.
Emarginula reticulata, *J. Sow.*	*r.*		
Puncturella Noachina, *Linn.*	*r.*		One dead.
Pileopsis Hungaricus, *Linn.*	*r.*		One dead.
Acmæa virginea, *Müll.*	*r.*		Living in 40 fathoms.
Dentalium entale, *Linn.*	*c.*	*c.*	
Chiton asellus, *Chemn.*	*r.c.*		
lævis, *Penn.*	*r.*		One living.
marmoreus, *Fab.*	*r.*		One living.
Hero formosa, *Lovén*	*r.*		One specimen.
Doto fragilis, *Forbes*	*r.*		

LAMELLIBRANCHIATA.

Anomia ephippium, *Linn.*	*r.*		Var. squamosa.
Pecten opercularis, *Linn.*	*r.*	*r.*	Small.
tigrinus, *Müll.*	*r.c.*	*r.*	
pusio, *Penn.*	*r.*		Valve.
Lima Loscombii, *Sow.*	*r.c.*		One alive & several valves.
Modiola modiolus, *Linn.*	*r.c.*		
Mytilus edulis, *Linn.*	*r.*		Small, alive in 15 fathoms.
Crenella discors, *Linn.*	*r.*		One dead.
nigra, *Gray*	*r.*		
marmorata, *For.*	*r.*	*r.*	
Nucula nucleus, *Linn.*	*r.*		
Leda caudata, *Don.*	*c.*	*r.c.*	
Cardium echinatum, *Linn.*		*r.c.*	
edule, *Linn.*	*r.*		A valve.
fasciatum, *Mont.*	*c.*		
Lucina borealis, *Linn.*	*r.*		
flexuosa, *Mont.*	*r.*		Dead.
Cyprina Islandica, *Linn.*	*r.*		A valve, small.
Astarte compressa, *Mont.*	*v.c.*	*c.*	
sulcata, *Da Costa*	*r.c.*		
Venus Casina, *Linn.*	*r.*		
fasciata, *Don.*	*r.c.*	*r.*	
ovata, *Penn.*	*r.*	*r.c.*	

	Off Holy Island.	*Durham Coast.*	
Venus striatula, *Don.*	*r.*	*r.*	
Artemis exoleta, *Linn.*	*r.c.*		
lincta, *Pult.*	*r.c.*		
Lucinopsis undata, *Penn.*	*r.*		Valves.
Tapes pullastra, *Wood.*	*r.c.*		
virginea, *Linn.*	*c.*		Fine large specimens.
Mactra elliptica, *Brown*	*r.*	*r.c.*	
Tellina crassa, *Penn.*	*r.c.*		
pygmæa, *Phil.*	*r.*		
Psammobia tellinella, *Lam.*	*r.c.*		Good specimens
Solen pellucidus, *Lam.*		*r.*	
Mya truncata, *Linn.*	*r.*		Valves.
Saxicava rugosa, *Linn.*	*r.c.*	*r.*	
Thracia villosiuscula, *Macg.*	*r.*	*r.*	
TUNICATA.			
Ascidia sordida, *Ald. & Han.*	*r.*	*r.*	
Molgula arenosa, *Ald. & Han.*	*c.*	*r.*	
Pelonaia corrugata, *For. & Goods.*		*r.*	

Report on the Crustacea, by the Rev. Alfred Merle Norman, M.A.

The total number of Crustacea obtained during the expedition was 63. Mr. G. S. Brady will notice separately the Oceanic Entomostraca, Mr. Hodge the Pycnogonoidea, and the following catalogue embraces the other species which were procured.

It will be observed that very few species are inserted as having been dredged off Seaham; the reason of this is that the only separate list of the Seaham Crustacea preserved was a short one of those species which were not taken off Berwick.

	Off Berwick.	*Off Seaham.*
Stenorhynchus rostratus, *Linn.*	*f.*	
Inachus Dorsettensis, *Penn.*	*r.*	
dorhynchus, *Leach*	*r.*	
Hyas coarctatus, *Leach*	*c.*	
Cancer pagurus, *Linn.*	*c.*	
Portunus pusillus, *Leach*	*c.*	
holsatus, *Fabr.*	*f.*	
Ebalia tuberosa, *Penn.*	*f.*	
Pagurus Bernhardus, *Linn.*	*c.*	

	Off Berwick.	Off Seaham.	
pubescens, *Kroyer*	*c.*		This name must be adopted instead of *P. Thompsonii*, Bell.
lævis, *Thompson*	*f.*		
cuanensis, *Thomp.*	*r.*		A rare species on this coast.
Hyndmanni, *Thomp.*	*f.*		
Galathea squamifera, *Leach*	*f.*		
Andrewsii, *Kin.*	*f.*		
intermedia, *Kroyer*	*c.*		Mr. Spence Bate's *Galathea dispersa* is clearly synonymous with Kroyer's species.
Porcellana longicornis, *Penn.*	*f.*		
Crangon vulgaris, *Fabr.*	*f.*		Three fathoms.
spinosus, *Leach*	*f.*		
Allmanni, *Kin.*	*c.*		26-46 fathoms.
trispinosus, *Hails.*	*r.*		A single specimen, the second taken on the coast. Holy Island harbour, 3 fathoms.
nanus, *Kroyer*	*r.*		*C. bispinosus*, Westwood, Kroyer's name having precedence
Hippolyte varians, *Leach*	*f.*		
pusiola, *Kroyer*	*c.*		
securifrons, *Norman*	*f.*		46 fathoms.
Pandalus annulicornis, *Leach*	*c.*		
brevirostris, *Rathke*	*c.*		*Hippolyte Thompsoni*, Bell= *Pandalus Thompsoni*, Norman = *Pandalus Barleii*, Bate. It is described by Rathke in *Nov. Act. Acad. Cæs. Leopold; Nat. Cur.* 1843, vol. xx. p. 17, and ranges from Norway to the Adriatic Sea.
Diastylis Rathkii, *Bate*	*r.*		This is scarcely, I think, Kroyer's species. A single example obtained.
Montagua monoculoides, *Mont.*	*r.*		Between tidemarks. Fern Islands.
Lysianassa longicornis, *Lucas*	*r.*		One specimen. New to this coast.
Anonyx denticulatus, *Bate*	*f.*		
longipes, *Bate*	*r.*		One specimen only.
Ampelisca Gaimardi, *Kroyer*	*c.*		
Haploops tubicola, *Lillj.*	*c.*		First discovered as British off Berwick in the Expedition of 1862, and now again taken in the same locality, where it seems to be abundant. Forty-six fathoms.
Otus carinatus, *Bate*	*r.*		A single specimen. New to this coast, and an interesting addition to our Amphipoda. Taken ten miles off Berwick, 46 fathoms, gravel.

	Off Berwick.	Off Seaham.	
Eusirus Helvetiæ, *Bate*	*r.*		
Acanthonotus Owenii, *Bate*	*c.*		
Dexamine vedlomensis, *Bate and West.*	*r.*		46 fathoms, ten miles off Berwick.
Amathilla Sabini, *Leach*	*c.*		Between tidemarks. Fern Islands.
Megamœra longimana, *Leach*	*f.*		26-46 fathoms.
othonis, *Edw.*	*f.*		do. do.
Amphithoe rubricata, *Mont.*	*c.*		Tidemarks, Fern Islands.
Podocerus pelagicus, *Leach*	*r.*		Three fathoms, sand.
capillatus, *Rathke*	*r.*		Low water mark. Fern Islands.
variegatus, *Leach*		*r.*	One specimen.
Cerapus difformis, *Edw.*	*f.*		13 fms. inside Fern Islands.
Dercothoe punctatus, *Edw.*	*r.*		46 fathoms.
Arcturus intermedius, *Good.*	*c.*		Clinging in considerable numbers to *Echinus Dröbachensis* (Müller).
Idotea entomon, *Linn.*	*c.*		Between tidemarks. Fern Islands.
Caligus curtus, *Müll.*	*c.*		On cod.
rapax, *M. Edw.*	*c.*		On cod.
Sacculina Carcini, *Thomp.*	*r.*		Dredged off Berwick, attached to the abdomen of *Portunus holsatus*.
Peltogaster Paguri, *Rathke*		*r.*	Parasitic on the abdomen of *Pagurus Bernhardus*, off Sunderland.
sulcatus, *Lillj.*		*r.*	Gregariously parasitic on the abdomen of *Pagurus lævis*, off Sunderland. New to Britain.
Clistosaccus paguri, *Lillj.*		*r.*	On *Pagurus lævis*. New to Britain.

The most interesting of the foregoing Crustacea are *Lysianassa longicornis* (Lilj) and *Otus carinatus* (Bate), two Amphipods which had not been previously met with in this district, and the last four species of the list.

No section of Marine Zoology has of late years created greater interest than the curious animals which are included in the strange and abnormal order *Sacculinacea*. To this order belong the three genera *Sacculina*, *Peltogaster*, and *Clistosaccus*. These animals in the mature state are parasitic upon the abdomen of various stalk-eyed Crustacea, to which they are permanently attached by a disk of greater or less size.

The structure of the animal is of the most simple kind. An ovate, cylindrical, somewhat quadrate or subtriangular body is almost entirely filled with ova, which are contained either in a single sac, or in very numerous ramifying tubes. These with two elongate organs presumed to be testes, but which may possibly be cement glands, are almost the only organs which are recognizable either externally or internally. No trace of limbs, no vestige of manducatory, scarcely a sign of digestive, and none of respiratory organs, is observable. The young are excluded through a small orifice which is situated at some distance from the sucking disk; and through this orifice water is also admitted into the cavity of the body and among the eggs. The sucking disk varies considerably in size in the different species, and is either simple or margined with an extended border, or sometimes furnished with fine fibres, which, penetrating the tissues of the crab, imbibe nourishment from them by endosmose in a manner which reminds us not a little of the connection which exists between the misseltoe and the tree on which it grows, and from which it derives its support. It is not improbable that it may hereafter be proved that these penetrating tubular fibres are characteristic of all the species of this order.

It would be impossible to assign to the Sacculinacea their right position in the animal kingdom from the mere examination of the mature form, and no animals have ever been more bandied about from one class to another than these parasites. The early stages and development of the young, however, clearly prove, as was first observed by Mr. William Thompson of Belfast, that the Sacculinacea are Crustacea; and if, in addition to the evidence afforded by the form of the first stage of the larva, which closely resembles that of the Cirripedia, the supposition of Lillejeborg be correct, that a cypris-formed case, which he observed attached to one extremity of a small Peltogaster, was the slough of the second stage of the larva still clinging to the animal which had been developed from it, there can be little doubt of the correctness of the theory which that eminent carcinologist has advanced, that these wonderful Trematoid parasites are an aberrant order of the sub-class Cirripedia. I

would refer those who may be interested in this subject to the various and valuable papers by continental naturalists, of which translations have from time to time been published in the *Annals and Magazine of Natural History*, namely, that by Steenstrup, 2 Ser. Vol. xvi. 1855, p. 155; that by Leuckart, 3 Ser. Vol. iv. 1859, p. 425; those by Lilljeborg, 3 Ser. Vol. vi. 1860, pp. 162 and 260, and Supplement, 3 Ser. Vol. vii. 1861, p. 47; and that by Fritz Müller, 3 Ser. Vol. x. 1862, p. 44. In our own country, Mr. William Thompson was the first naturalist to notice these animals. In the *Entomological Magazine*, Vol. iii. 1836, p. 452, he described his *Sacculini Carcini*, together with its larva, and assigned to it its right position among the Crustacea. The only previous author who had ever noticed these animals was Cavolini; but although he witnessed the extrusion of the young, he thought that the sac, whence they issued, and which he well describes as similar in form to the seed vessel of *Capsella bursa-pastoris*, was not a perfect animal, but the ovisac of a large Crustacean. Professor Bell notices in his *History of British Stalk-Eyed Crustacea*, p. 108, certain parasites which he found attached to the abdomen of *Carcinus mænas* and *Portunus marmoreus*, which his characteristic description clearly identifies with Sacculina. Lastly, Dr. Anderson has published in the *Annals of Natural History* for January, 1862, a paper on Sacculina, in which he records the occurrence of *Sacculina Carcini* and *Peltogaster Paguri* in the Firth of Forth, and describes what he considers to be a new species of the former genus, under the name of *Sacculina triangularis*.

It will be observed that *Sacculina Carcini* and *Peltogaster Paguri*, two out of the three species of Sacculinacea which have hitherto been noticed in Great Britain, were obtained during the recent expedition, and that *Peltogaster sulcatus* and *Clistosaccus Paguri*, which had up to the present time only been found by Lilljeborg on the Norway coast, were added to our fauna. Full descriptions and figures of these species are given in those papers by Lilljeborg in the Annals of Natural History to which allusion has already been made.

Report on the Pelagic Entomostraca (Calanidæ and Polyphœmidæ), by George S. Brady.

The animals which form the subject of this report are free-swimming Crustacea of very minute dimensions, which occur often in countless numbers near the surface of the sea. They are, in fact, so numerous as to constitute the chief food of several kinds of fish. They are met with most abundantly in very calm weather, perhaps because they come most freely to the surface when the sea is smooth. In rough weather, such as occurred during the time of the dredging operations this year, they are taken sparingly, owing to the difficulty of working the drift-net. It was for this reason, more than from any scarcity of the animals, that our captures were not very extensive, for the water was plainly seen to be swarming with them.

Owing to the short time available for the preparation of the report of last year's dredging expedition, the Entomostraca taken on that occasion were only cursorily noticed. On this account I have included in my table the captures of both years, specifying the localities for each species. The list comprises five species not previously recognized as British, *Evadne polyphemoides*, *Ichthyophorba denticornis*, *I. angustata*, and *Dias longiremis;* also a species probably referable to *Phaënna spinifera*, Cls.

	50 miles E. off Tynemouth.	100 miles E. by N. off Tynemouth.	Inside Fern Islands.	10 miles E.N.E. off Holy Island.
Evadne Nordmanni, *Loven*	common	common	——	——
Evadne polyphemoides, *Leuckart*	scarce	scarce	——	——
Temora Finmarchica, *Gunner*	abundant	abundant	——	scarce
Irenæus Patersonii, *Templeton*	not rare	——	scarce	common
Phaënna spinifera (?) *Cls.*	common	——	scarce	——
Dias longiremis, *Lilj.*	common	scarce	abundant	common
Cetochilus helgolandicus, *Cls.*	——	scarce	common	——
Ichthyophorba angustata, *Cls.*	common	——	common	common
,, denticornis, *Cls.*	common	——	common	common

The list above given differs very materially from that presented to the British Association in August last, the nomenclature I have here adopted being that of the recently published monograph of Dr. Claus.* From the figures and descriptions of that work it appears clear that *Diaptomus longicaudatus*, Lubbock, is

* Die frei lebenden Copepden, mit besonderer Berucksichtigung der Fauna Deutschlands, der Nordsee und des Mittelmeeres.

identical with *Temora Finmarchica*, Gunner: I have, therefore, adopted the latter name as having the claim of priority. I am, however, at a loss to understand why Dr. Claus does not refer to the former name as a synonym. This species is often exceedingly abundant in tidal pools on our coast. A species occurring in considerable numbers, and noticed in the first report as probably a species of *Euchæta*, I have referred, though with some doubt, to *Phaënna spinifera*, Cls. The *Cetochilus septentrionalis* of Goodsir is divided by Dr. Claus into two species, of which I have hitherto recognized only one amongst our captures, *C. helgolandicus*. Liljeborg's species, *Ichthyophorba hamata*, is probably identical with *I. angustata*, Cls., and in addition to this I have detected specimens of *I. denticornis*, Cls. I cannot, however, speak certainly as to the relative frequency of the two forms on our coast, as they were both at first referred to *I. hamata*, and the bad preservation of the specimens renders it, after this lapse of time, not a very easy matter to distinguish minute details of structure.

Report on the Pycnogonoidea, by George Hodge.

Only two species were obtained, *Pycnogonum littorale* and *Phoxichilidium petiolatum*.

	Berwick Bay.	*Durham Coast.*	
Pycnogonum littorale	*	.....	...Two or three small specimens.
Phoxichilidium petiolatum		*	...Two specimens from 35 fms.

Report on the Echinodermata, by George Hodge.

Twenty-seven species of Echinodermata were obtained: of these three are interesting additions to our Fauna, viz., *Ophiura squamosa* (Lütken), which is new to Britain; and *Amphiura Chiajei* (Forbes), and *Thyone raphanus* (D. & K.), which are new to our coast.

The following species, which appear in last year's list, were not obtained this year, viz.:—*Uraster roseus*, *Solaster endeca*, *Ocnus lacteus*, *Thyonidium commune*, *Thyonidium pellucidum*, and *Psolus phantopus:* but as a set off there are *Ophiura squamosa*,

Amphiura Chiajei, *Ophiocoma granulata*, *Amphidotus cordatus*, *Cucumaria elongata*, and *Thyone raphanus*.

Ophiura squamosa is a rare species recently described; it has been taken at Cullercoats by Mr. Alder, and at Seaham by myself; we had not, however, recorded its capture.

Amphiura Chiajei is also a rare species; only two or three much mutilated specimens were obtained, although large numbers of the discs and rays of *Ophiocoma filiformis* were dredged, with which it is associated: it is impossible to obtain these species in a perfect state with the ordinary dredge.

Considering the little dredging that was done, owing to unfavourable weather, the list is a very fair one. The number of species obtained from the three localities is as follows:—

Fern Islands.....	9 species.
Berwick Bay.....	19 ,,
Durham Coast	19 ,,

	Fern Islands. 13-17 fms.	Berwick Bay. 26-46 fms.	Durham Coast. 23-35 fms.	
Ophiura texturata, *Lamk.*		*	*	Several specimens.
albida, *Forbes*	*	*	*	Common.
affinis, *Lütken*	*	*		Frequent.
squamosa, *Lütken*		*		Rare, a few specimens from 46 fathoms.
Ophiocoma filiformis, *Müller*		*	*	Several from 35-46 fathoms.
Chiajei (Amphiura Chiajei, *Forbes*)			*	Rare, two or three from 35 fathoms.
bellis, *Link*	*	*	*	One or two from each locality.
Goodsiri, *Forbes*	*	*	*	Frequent.
granulata, *Link*	*			Several from 13 fms.
rosula, *Link*	*	*	*	Common.
Uraster glacialis, *Linn.*			*	Rare, 3 small specimens from 35 fms.
rubens, *Linn.*	*	*	*	Several.
Echinaster oculatus, *Penn.*		*		A single specimen from 26 fathoms.
Solaster papposa, *Linn.*		*		Two from 26 fms.
Asterias aurantiaca, *Linn.*		*	*	Several.
Luidia Sarsii, *D & K.*		*	*	Four specimens: one from 46 and three from 35 fathoms.
Echinus sphæra, *Müller*	*	*		Very common in 13 fathoms.

	Fern Islands. 13-17 fms.	Berwick Bay. 26-46 fms.	Durham Coast. 23-35 fms.	
Echinus miliaris, *Leske.*		*		Several from 24-46 fathoms.
neglectus, *Lamk.*	*			Very common in 13 fathoms.
Echinocyamus pusillus, *Müller,*		*	*	Several from 26-46 fathoms.
Spatangus purpureus, *Müller*		*	*	Do. 35-46 fms.
Brissus lyrifer, *Forbes*			*	Do. 35-46 fms.
Amphidotus roseus, *Forbes*		*	*	Do. 35-46 fms.
cordatus, *Pennant*			*	Two specimens.
Cucumaria elongata, *D. & K.*			*	Two or three from 35 fathoms.
Thyone fusus, *Müller*			*	Two from 35 fathoms
raphanus, *D. & K.*		*	*	Two specimens from 46 and 35 fms.

Report on the Zoophytes, by Joshua Alder.

The Zoophytes collected do not afford much to remark upon. Those dredged on the Durham coast are the most interesting. Among them is a *Scrupocellaria* not yet described as British, but which I had previously got on this coast. It proves to be the *S. Delilii*, a species inhabiting the Mediterranean, and which has also been met with at Madeira. The rare *Hydractinia areolata* was procured alive and bearing medusoids, which Mr. Hodge had the opportunity of examining. They differ from those I had previously described in having eight tentacles of equal length, without intermediate tubercles. In all other respects they agree with those before described, and were attached, as in the former instance, to the encrusting base of the polypary. No difference could be detected in the polypes themselves. A small *Atractylis* was also met with alive, and the development of its medusoids examined by Mr. Hodge. They agree with those of the *Perigonimus minutus* of Professor Allman, described in the Report of the British Association for 1862, in having the umbrella conical at the top, and should probably be referred to that species, though the polypary is rather larger than there described and occasionally slightly branched. The difficulty of distinguishing the species of this genus is very great. The specimens were got in 35 fathoms off Seaham, attached to a shell of *Turritella communis* and to the operculum of a *Fusus*.

	Off Holy Island.	*Durham Coast.*	
POLYZOA.			
Salicornaria farciminoides, *Johns.*	*r.c.*	*r.c.*	
Cellularia Peachii, *Busk*	*r.*		
Menipea ternata, *Ellis & Sol.*	*r.c.*		
Scrupocellaria scruposa, *Linn.*		*r.c.*	
Delilii, *Aud.*		*r.*	
Gemellaria loricata, *Linn.*		*r.*	
Bugula flabellata, *J. V. Thomp.*	*r.*		
Murrayana, *Bean*		*r.*	
Flustra foliacea, *Linn.*	*r.*		A piece.
Membranipora pilosa, *Linn.*	*r.c.*		
rostrata, *Ald. MS.*	*r.*		
Pouilletii, *Aud.*	*r.c.*		
unicornis, *Flem.* (*Ald.*)	*r.*		
Lepralia concinna, *Busk*	*r.c.*		
trispinosa, *Johns.*	*r.c.*		
ciliata, *Pall.*	*r.*		
Peachii, *Johns.*	*r.c.*		
punctata, *Hassall*		*r.*	
Malusii, *Aud.*	*r.*		
Cellepora pumicosa, *Linn.*	*c.*	*c.*	
avicularis, *Hincks*	*c.*	*c.*	
ramulosa, *Linn.*	*r.*		
dichotoma, *Hincks*	*r.c.*		
Tubulipora hispida, *Flem.*	*r.c.*	*r.c.*	
serpens, *Linn.*	*r.c.*	*r.c.*	
Alecto dilatans, *Johns.*	*r.*		
Crisia eburnea, *Linn.*	*c.*	*r.c.*	
Crisidia cornuta, *Linn.*	*r.*		
Alcyonidium gelatinosum, *Pallas*	*r.c.*		Small
parasiticum, *Flem.*		*r.c.*	
Pedicellina echinata, *Sars*	*r.*		
HYDROZOA.			
Hydractinia areolata, *Alder*		*r.*	One specimen on *Natica Alderi.*
Eudendrium—species	*r.*		
Atractylis minutus ? *Allman*		*r.*	
Tubularia indivisa, *Linn.*	*r.c.*	*r.c.*	
gracilis, *Harvey*	*c.*	*r.*	
larynx, *Ellis*	*r.*		
Halecium halecinum, *Ellis*	*r.c.*	*c.*	Some with male capsules
Beanii, *Johns.*		*r.c.*	Parasitical on the last.
Sertularia polyzonias, *Linn.*	*r.c.*	*r.c.*	
tenella, *Alder*	*r.*		

	Off Holy Island.	*Durham Coast.*	
Sertularia rugosa, *Ellis*		*r.c.*	
rosacea, *Linn.*	*r.c.*		
tamarisca, *Linn.*	*r.*		A specimen with male capsules.
abietina, *Linn.*	*c.*	*c.*	
filicula, *Ellis & Sol.*	*c.*		
argentea, *Ellis & Sol.*	*r.c.*		
fusca, *Johns.*	*r.*		Two small specimens.
Thuiaria thuia, *Linn.*	*r.c.*	*r.c.*	
Antennularia antennina, *Linn.*		*r.c.*	
ramosa, *Lamx.*		*r.c.*	
Plumularia falcata, *Linn.*	*r.c.*	*c.*	
pinnata, *Linn.*	*r.c.*	*r.*	One fine specimen.
setacea, *Ellis*		*r.c.*	Parasitical on *Antennularia ramosa.*
Catharina, *Johns.*	*r.c.*	*r.c.*	
Laomedea dichotoma, *Linn.*	*r.*		
longissima, *Pallas*	*r.c.*		
Campanularia volubilis, *Linn.*	*r.c.*	*c.*	On *Sertularia abietina.*
Johnstoni, *Alder*	*r.c.*	*r.c.*	Do.
Hinksii, *Alder*	*r.*		
Calicella dumosa, *Flem.*	*r.c.*	*r.c.*	
syringa, *Linn.*	*r.c.*		
Reticularia serpens, *Hassall*	*r.c.*	*r.c.*	
Coppinia arcta, *Dalyell*	*r.c.*	*r.c.*	
	ACTINOZOA.		
Alcyonium digitatum, *Linn.*	*r.*	*r.*	
Pennatula phosphorea, *Linn.*		*c.*	

Report on the Foraminifera, by Henry B. Brady, F.L.S.

Parcels of sand were brought home for examination with respect to their Rhizopoda, from two of the localities dredged, viz.:—

Eight miles N.E. of Holy Island.....35 Fathoms.
Six miles E. of Holy Island .....25 Fathoms.

In both cases the material was coarse and rough and very unfavourable for the existence of the delicate shells of the Foraminifera. The total number of specimens they contained was very small, and the number of species as well as their condition much inferior to the results of last year's dredging on neighbouring ground. With two or three exceptions now to be noticed all of the forms obtained were recorded in the former list.

The most interesting occurrence is that of four specimens of

Lagena distoma (P. and J.), a delicate, much elongated, one chambered species, having an aperture at each end and traversed by faint longitudinal striæ. This has only recently been noticed as a British species from a single shell found in the sand dredged by Mr. Jeffreys in the Shetlands. Messrs. Parker and Jones state that it occurs on the Norwegian coast, a fact of interest in connection with Mr. Alder's remarks on the boreal character of the Northumbrian marine fauna. Thus our list of the Lagenida is again complete, the whole of the species recorded as British being found on the Northumberland coast.

In the sand from the second locality named, single specimens of two forms not obtained last year were found, viz. :—*Cristellaria subarcuatula*, Will. (*C. crepidula*, F. and M.), and *Rotalina mamilla*, Will. (*Discorbina rosacea*, D'Orb.), both valuable additions to our local fauna.

A full-sized specimen of *Cassidulina lævigata* (D'Orb.) confirms its occurrence on our coast, noted last year on the strength of a very small and somewhat doubtful one.

Report on the Algæ, by George S. Brady.

Dredging in deep water and on an exposed coast is not likely to be very productive in respect of Algæ; nevertheless on this occasion some species were noticed which deserve record. *Melobesia calcarea*, Ell. & Sol., was dredged in considerable abundance on rocky ground inside the Fern Islands. This species had not previously been taken in our district. In the same place occurred *Phyllophora rubens*, Grev., *Gelidium corneum*, Lamour. var. *latifolium*, and a *Callithamnion*, probably *C. Borreri*, Ag., and if so a very desirable addition to our Flora. Only one specimen was found, and that so small that we cannot pronounce certainly as to the species. In twenty-five fathoms, on a gravelly bottom, about six miles east of Holy Island, we brought up a splendid specimen of *Desmarestia ligulata*, measuring nearly eight feet in length. The plant was perfect even to the scutate root, and we suppose must have grown in the place where it was dredged,—certainly an unusual depth for marine vegetation of that character.

XIV.—*List of the British Pycnogonoidea, with descriptions of several new species.** By George Hodge. [Pl. IV. & V.]

No complete list of the British Pycnogons has appeared, and such information as we possess is scanty and scattered: it is difficult to account for this neglect, as these animals possess considerable interest, both in their life-history, and their peculiarly degraded physiological features.

An examination of such records as I have been able to consult, has enabled me to compile a list of twenty-two species—the total number recorded as British. With two exceptions, that of a *Phoxichilidium* by Mr. Gosse, and a *Phoxichilidium* and a *Nymphon* by myself, no new species have been published since Harry Goodsir's and Dr. Johnston's time. The former described seven species, principally from the Frith of Forth; it is possible, however, that two or three of them might not stand a very critical examination. The list, as it now stands, contains

13 species of *Nymphon*,
2 ,, *Pallene*,
4 ,, *Phoxichilidium*,
1 ,, *Pasithoe*,
1 ,, *Phoxichilus*,
1 ,, *Pycnogonum*,

in all 22 species, including the four which were recorded in my Report of the Pycnogons obtained last year, during the dredging expedition to the Dogger Bank.

I have now to increase this list by the addition of ten species, seven of which are new to science, and three new to Britain.

The new species are contained in the following genera:—

Ammothoa, a genus not before represented by any British form.

Achelia, a new genus which I found it necessary to establish.

Pallene and *Phoxichilidium*.

The genus *Ammothoa* is in some respects like *Nymphon*, the most decided difference being the greater number of joints of

* This paper was read also at the Newcastle Meeting of the British Association.

the palpi; *Ammothoa* possessing eight,* whilst *Nymphon* has only five. The foot-jaws in *Nymphon* are always as long or longer than the rostrum: in *Ammothoa* they are much shorter.

I have two new species to describe, for which the specific names of *brevipes* and *longipes* are proposed.

Ammothoa brevipes (Hodge). Plate IV., Figs. 1-4.

Limbs short and robust, furnished with moderately long strong spines. Rostrum conical, with the apex truncate. Foot-jaws nearly two-thirds the length of the rostrum: palpi equal in thickness throughout, if anything slightly thicker at the free end. Oculiferous tubercle terminating in a pointed wart directed backwards. Abdomen long, slightly tapering. Length $\frac{4}{100}$ inch.

Several specimens have occurred on the Durham coast from deep water.

Ammothoa longipes (Hodge). Plate IV., Figs. 5-6.

Animal slender. Rostrum stout, as long as the thorax, tapering to a blunt point. Palpi long and slender, the four terminal joints of equal length. Foot-jaws long, fingers destitute of teeth. Oculiferous tubercle slightly tapering. Length $\frac{7}{100}$ inch.

A single specimen from Polperro.

Achelia is distinguished by the possession of two pairs of palpi; one pair long and slender, the other short and stout. The genus may be thus characterized:—

Antennæ two-branched, one pair long and slender, eight-jointed; the other pair short and stout, two-jointed, and produced immediately in front of the oculiferous tubercle.

In some respects this genus agrees with a form possessing two pairs of palpi, which Kroyer named *Zetes*; it may, however, at once be distinguished by the very different character of the rostrum, that of *Zetes* being much elongated and seated upon a sort of stalk, and that of *Achelia* being short and stout. I have three species of this genus to describe, for which the specific names of *echinata*, *hispida*, and *lævis* are proposed.

* The foreign forms are said to possess nine.

Achelia echinata (Hodge). Plate IV., Figs. 7-10.

Animal robust, with moderately long legs, furnished with strong spines produced from little eminences upon the limbs and body. The oculiferous tubercle is directed forwards, and terminates in a little point directed backwards. Inner palpi of same length as oculiferous tubercle, outer longer than rostrum. Colour fine sienna to a pale straw. Length $\frac{7}{100}$ inch.

This species has been found in the Channel Islands, the Isle of Man, and upon the Durham coast. It is by no means uncommon from low tide to the depth of five fathoms.

Achelia hispida (Hodge). Plate V., Fig. 11.

Animal robust, hairy. Limbs long, first four joints much stouter than the others. Thorax much produced in front. Inner palpi large and stout, with a circlet of little spines at the base, and at the top of the first joint; outer palpi longer than rostrum. Oculiferous tubercle scarcely reaching beyond origin of inner palpi. Length $\frac{9}{100}$ inch.

Several specimens from Polperro.

Achelia lævis (Hodge). Plate V., Fig. 12.

Animal robust, limbs smooth and regular in form, with a few small hairs scattered over them, principally on femoral and tarsal joints. Inner palpi rather long, slender; outer palpi as long as rostrum. Oculiferous tubercle small, produced considerably behind inner palpi. Length $\frac{9}{100}$ inch.

Several specimens from Polperro.

Phoxichilidium virescens (Hodge). Plate V., Figs. 13-15.

Rostrum stout, slightly thickened in the middle, truncate at the apex. Foot-jaws slender and closely approximated at their origin, each finger with 6-8 teeth. Legs moderately long. Colour pea-green. Length $\frac{7}{100}$ inch.

Several specimens from Polperro.

This species might at first sight be mistaken for *Phoxichilidium olivaceum* (Gosse), but the closely approximated foot-jaws at once show its distinct character.

Pallene pygmæa (Hodge). Plate V., Figs. 16-17.

Thorax robust, legs long and slender, constricted at the joints, last joint falciform, with a strong toothed shoulder at the base. Two strong spines on the sixth joint. Rostrum short and stout. Foot-jaws closely approximated. Oculiferous tubercle moderately long. Abdomen stout. Length $\frac{4}{100}$ inch.

This species was taken by Mr. Spence Bate in the neighbourhood of Plymouth, so far back as 1853, and by him noticed in a paper of that year read before the British Association at Hull. It was, however, neither named nor described, his remarks bearing upon the larval stages of these animals. I have also taken a single specimen upon the Durham coast.

The three species new to Britain all belong to the genus *Nymphon*. They were described by Kroyer in Gaimard's Scandinavian Voyage. One species, *Nymphon Strömii*, has been taken in Shetland by the Rev. A. M. Norman; the other two, viz., *Nymphon mixtum* and *Nymphon longitarse*, have been taken by myself on the Durham coast.

The following list contains all the species at present recorded as inhabiting the British seas :—

Nymphon (Fabricius)
- *gracile*, Leach.
- *grossipes*, Fabricius.
- *fœmoratum*, Leach.
- *pictum*.
- *giganteum*, Johnston.
- *longitarse*, Kroyer.
- *mixtum*, Kroyer.
- *Strömii*, Kroyer.
- *hirtum*, Eabricius.
- *brevitarse*, Kroyer.
- *Johnstoni*, Goodsir.
- *spinosum*, Goodsir.
- *pellucidum*, Goodsir.
- *similis*, Goodsir.
- *minutum*, Goodsir.
- *brevirostre*, Hodge.

Ammothoa (Dana)
- *brevipes*, Hodge.
- *longipes*, Hodge.

Achelia (Hodge)
- *Achelia echinata*, Hodge.
- *hispida*, Hodge.
- *lævis*, Hodge.

Pallene (Johnston)
- *brevirostris*, Johnson.
- *circularis*, Goodsir.
- *pygmea*, Hodge.

Phoxichilidium (M. Edwards)
coccineum, Johnston.
globosum, Goodsir.
olivaceum, Gosse.
petiolatum, Kroyer
(*Pallene attenuata*, Hodge)

Phoxichilidium virescens, Hodge
Pasithoe (Goodsir)
vesiculosa, Goodsir
Phoxichilus (Latreille)
spinosus, Montagu.
Pycnogonum (Fabricius)
littorale, Strom.

There can be little doubt that a careful examination of the species found on various parts of our coast would add many new forms to this list, especially amongst the smaller species.

Whilst most departments of Marine Zoology have made rapid strides within the last few years, our knowledge of the Pycnogons has scarcely advanced: no doubt this is owing, in a great measure, to the difficulty of determining the species in consequence of there being no complete list. It is hoped the foregoing may in some degree supply this want, and lead to these animals being better known and understood.

EXPLANATION OF PLATES IV. & V.

Fig 1 Ammothoa brevipes.
2 „ foot-jaws.
3 „ tarsus, &c.
4 „ side view.
5 Ammothoa longipes.
6 „ tarsus, &c.
7 Achelia echinata.
8 „ side view.
9 „ rostrum, palpi and oculiferous tubercle.
10 „ tip of false foot of female.
11 Achelia hispida.
12 Achelia lævis.
13 Phoxichilidium virescens.
14 „ foot-jaws.
15 „ tarsus, &c.
16 Pallene pygmæa.
17 „ tarsus, &c.

XV.—*The Coal Miners of Durham amd Northumberland: their Habits and Diseases.** By Robert Wilson, M.D.

We search in vain amongst the works on Biology for a satisfactory definition of Life. Our recent writers on the subject consider life as a non-entity; that *per se* it has no existence. And absurd as it may appear to suppose that that does not exist which all are conscious of possessing, this idea is perhaps as near the truth as it is possible for us to get. It is sufficient for all practical purposes to consider life as a manifestation of a mode of existence—in short, a state or condition, and that state or condition as

> "The fiat of that mighty God,
> Whose word flew forth at once to its effect;
> Who called for things that were not, and they came."

Yet however incorrect the theories as to the nature of Life may be, and however vain the attempts to define it, for convenience it is well to have a phrase to express the phenomena manifested in vital organisms; that of Biclard is perhaps as good as any, viz., that "Life is organization in action." To convey this idea I shall use the shorter, but not less arbitrary phrase, "vital action." Death may be said to be the condition opposite to life. For similar reasons death cannot be defined, but as in the case of life, a definition is not of much practical importance, as all conceive correctly with regard to it. All animals have a conscious or intuitive knowledge that under certain circumstances only can the phenomena of life go on. That which we have called vital action must cease, and that permanent cessation of vital action called death must supervene. But the medical man has to deal with a state which may be said to be one of transition from life to death, viz., disease. And however unimportant it may be what theory we adopt as to the nature of life and death, it is of great consequence that we form a correct conception as to the real nature of disease; and unfortunately it is very difficult indeed to say whether most error exists on this subject amongst the educated or the uneducated. The cause of this is

* This paper was read also at the Newcastle meeting of the British Association (Sub-section D).

evident. All consider disease to be an entity, whereas, like life, it is a non-entity; it cannot exist *per se*, and can only be recognised as a state or condition, that state or condition being modified, perverted, or suspended vital action. Supposing, then, vital action to mean what is understood by life, modified or perverted vital action as what is understood by disease, and cessation of vital action as what is understood by death, we find that the two latter states—disease and death—are induced by influences brought to bear on the former state—life. It is thus the part of the physician not merely to relieve suffering and restore the balance of vital phenomena when deranged, but also to endeavour to detect and point out those influences which modify and destroy vital action—which induce the states known as disease and death. By so doing, his good offices will benefit not only those who live with him, but also the generations which are to follow.

It has been my privilege to attend to the ailments of pitmen daily during the last twelve years, and the object of this paper is not to add any new fact to physiology, nor to detail any new form of disease, but to show what effect the exclusive habits and peculiar occupation of the coal miner of the North of England have on his health and length of life.

A few years ago a gentleman came into this neighbourhood to fill an important situation in one of our large collieries. He arrived at his destination late at night, and slept at the inn. The following morning, on looking out, he immediately called the landlord and asked what all those cottages were for. "Cottages, sir, those are the pitmen's houses." "Good gracious!" said the Southerner, "I thought pitmen lived in the pit."

I think it will hardly be necessary to say they do not *live* in the pit; nevertheless they *work* there, and while at their work they breathe an atmosphere conveyed to them by artificial means, and often mingled with gases unfitted for respiration. They live in villages built expressly for them, at a short distance from the shafts of the pits. The villages consist of parallel streets or rows of houses. There are single rows and double rows. The houses are built end to end. Those in the single rows have one

principal apartment, the size being about six yards square; a pantry is attached behind, and there is a half story or garret above. There is a front door and a back door, and the windows, one in each apartment, are made to open by drawing the one half in front of the other. The houses in the double rows are about twice the size of those in the single ones; they are divided into two principal apartments by a partition running lengthways, with a communicating door in the centre of the partition. When a scarcity of houses exists in a colliery the communicating door is built up, and as in the single houses, there being a front door and a back door; the double house is thus easily converted into two single ones, and is occupied by two families instead of one. This, although a convenient, is by no means a salutary arrangement, the single houses built end to end being much more healthy than those built back to back. The double houses are occupied by men who have grown-up sons at work in the colliery; the single houses are occupied by men who have young families. Married men with no children can scarcely be said to exist amongst them. The floors are laid with a composition of lime, small coal, and gravel. The fire range is large, and fitted with an oven and a boiler for a constant supply of hot water. They have a plentiful supply of small coal, and the fire is never allowed to go out from one end of the year to the other.

Generally the houses are clean and comfortably furnished; a four-post bedstead, an eight-day clock, and a mahogany chest of drawers, have always been and are still considered the essentials of a well fitted-up house. The ornaments hung on their walls might form a rich field for psychological study. From them we can easily perceive the tendency of the mind of the owner. You find in one, Tom Sayers, Bob Brettle, and the Manchester Chicken; in another, the Primitive Methodists, New Connexion, or Wesleyan Methodists' preachers' plan; in another, the "Madonna and Child," decidedly *after* Rubens; in another, numbers of home-made cages, containing every variety of the finch tribe; in another, a trombone, cornet, or violin; and in all but the skip-jack's, you find the emblem of either the "Foresters," "Odd Fellows," or "Free Gardeners" benefit society. And

should you find yourself in a house with nothing to observe but bare walls, disorder, filth, and scanty furniture, you are not to suppose that the owner has no weakness—his has degenerated into vice or crime, and in all probability you are in the cottage not of the habitual drunkard, but of the gambler or the poacher. But, no matter what the failing or weakness of the pitman may be, if he is to enjoy the privilege of living in a pit village, he must work. He enjoys all the advantages of a despotic power and a monarchical government, and he must not only work, but he must perform that portion of work assigned to him. There is no branch of industry carried on with more system and regularity than coal mining. Officials and men have each their distinct duty, clear and unmistakeable. They rank much in the following order:—Viewer, under-viewer, overman, back overman, deputy, hewers, "off-handed men," putters, drivers, and boys. The viewer is supreme, and the under-viewer sees that his orders are carried into effect. The duties of the overman consist in visiting the workings every morning, receiving the reports from the deputies, making observations on the air currents, and general management of the underground work. To his office is sent an account of all the work done in the pit, and on the Wednesday before the "pay" (which is every alternate Friday afternoon), the overman "reckons" with the men, *i.e.* he compares the account received of their work with that kept by themselves. The back overman superintends the management of the pit from the time the overman leaves until five o'clock in the evening, when the pit is said to "loose" or stop work. The "caller," who is a man appointed to rouse the men in the morning, makes his first round at half-past twelve, and knocks at all the doors with D chalked on them. Those are the deputies' houses; they go to work an hour before the hewers. Their work consists of supporting the roof with props of wood, removing props from old workings, changing the air currents when necessary, and clearing, away any sudden eruption of gas or fall of stone that might impede the work of the hewer.

The coal in some parts of the pit is softer and more easily wrought than in others, and to prevent quarrelling and partiality

that to be hewn is divided into lots; they draw their lots once a quarter, this is called "kyeveling," and the place or lot assigned to each man is called his "kyevel." The hewers are divided into "fore-shift" men and "back-shift" men. The former work from one till nine, and the latter from nine till five. Each man works one week in the fore-shift and one week in the back-shift, alternately. Every man in the fore-shift marks 1 on his door —this is the sign for the caller to wake him at that hour. When roused by the caller, he gets up and dresses in his pit clothes, consisting of a loose jacket, vest, and knickerbockers, all made of thick white flannel; long stockings, strong shoes, and a close-fitting, thick leather cap. He then takes a piece of bread and water, or a cup of coffee, but never a full meal—many prefer to go to work fasting. With a tin bottle full of cold water or tea, a piece of bread, which is called his "bait," his Davy lamp, and "baccy box," he says good bye to his wife, and speeds off to work. Placing himself in the cage, he is lowered to the bottom of the shaft, where he lights his lamp and proceeds "in by," to a place appointed, to meet the deputy. The deputy examines each man's lamp, and if found safe, returns it locked to the owner. Each man then finding from the deputy that his place is right, proceeds onwards to his kyevel—his picks in one hand, and his lamp in the other. He travels thus a distance varying from one to six hundred yards, the height of the roof being from three feet six inches to four feet. To progress in this space the feet are kept wide apart, the body is bent at right angles with the hips, the head is held well down, and the face is turned forward. Arrived at his place, he undresses, and begins by hewing out about fifteen inches of the lower part of the coal; he thus undermines it, and the process is called "kirving;" the same is done up the sides, this is called "nicking." The process of kirving is conducted as follows:—The hewer sits on a low stool (four inches in height), and grasping his pick with both hands, makes successive horizontal blows. To give the greatest effect to the stroke his head is thrown to one side, his left leg extended and his right bent, his right elbow resting on the right thigh enables the leg to augment the force of the arms. The

coal thus hewn is called small coal, and that remaining between the kirve and the nicks is the "jud" or "top," which is either displaced by driving in wedges or blasted down with gunpowder. It then becomes the "roundy." The hewer fills his tubs, and continues thus alternately hewing and filling. Meanwhile the caller having roused the putters, drivers, and off-handed men, the pit "hings on," *i.e.*, starts work at five o'clock. The putters get down into the workings, and either push the full tubs along or get them pulled by ponies towards the shaft. The tubs are conducted into the cage by the "onsetter," and conveyed to "bank," where the coal is weighed, screened, and sorted for the market. Hewing is decidedly the hardest work in the pit. The men are generally perspiring freely by the time they reach their kyevel; and although they work almost in a state of nudity, in a few minutes after they begin to hew the perspiration is running from them in streams. Unless hindered by want of tubs this continues until the end of the shift. At nine o'clock the back-shift men arrive, and begin work, and the fore-shift men go home.

The pitman never feels hungry while at work, but on coming out he becomes ravenous, and takes food as soon as he enters his cottage. Many of the fore-shift men eat "crowdy," which is composed of oatmeal, hot water, and butter. Others take coffee or tea, with bread and butter, and some take dinner. The back-shift men always have dinner; this usually consists of roast beef or mutton and potatoes, with a boiled suet dumpling or pudding. They eat their pudding first, and beef or mutton after. They take animal food once a day only, and considering the great muscular exertion necessary in hewing, the amount of beef and mutton they eat is moderate. They seldom or never drink beer at dinner; most smoke a pipe after it, and then they wash. This washing process is done very effectually. A large wooden tub of hot water is placed before the fire, and the man then sits down on a small stool, with one leg on each side of the tub, and being supplied with a piece of soap, he begins by washing his hands, arms, and chest; head, neck, and face follow, and he ends with the lower extremities, one after the other. This

finished, if in the fore-shift, he goes to bed, his wife hands him his pipe lighted, and in a few seconds he is fast asleep. The back-shift men dress after dinner, and employ themselves as their fancy leads them. Quoits, bowling, and ball-playing are their out-door games; cricket, wrestling, and jumping are seldom practised. A species of pitch and toss called "scouling," is their great gambling game. Their house games are whist, draughts, and dominoes. Whatever amusement or subject they take up, it is stuck to perseveringly. They are very matter-of-fact, and have considerable powers of concentration. Every available piece of ground near the villages is converted into a garden, and almost every cottage has one attached to it. Some keep poultry, and most feed pigs. They cure their own bacon with great success. Their bread home-made. Two kinds are used by them—white and brown; "spiced wigs" prevail on Sundays, and the "singing hinny" makes its appearance on grand occasions. Great excesses are still prevalent on the pay Friday and Saturday nights. Ale is the liquor chiefly drunk. But no matter what excesses a man may commit on the pay week end, he must be at his post on the Monday following, or run the risk of being discharged; so that the habitual drunkard is sure to lose his employment. In all my experience among them I have never known a case of dipsomania, nor have I had to treat a single case of delirium tremens: this is more than I can say for many other callings. By the rules of their benefit societies no one, while receiving sick money, is allowed to frequent public-houses, he is not to be out later than nine o'clock in summer, and seven o'clock in winter, and he cannot leave home without the sanction of his medical attendant. Men who are injured while at work in the pit get a weekly allowance of five shillings from the owners of the colliery. This is called "smart money."

We have now to inquire what there is in all this to modify or destroy vital action. Having procured from the Registrar-General a copy of the sanitary statistics relating to miners—submitted to the International Statistical Congress—I find in a table contained in that document of the aggregate number

of deaths of miners, fifteen years old and upwards, in nineteen districts of England and Wales, during the five years 1849-53, from all causes 7,434 deaths registered. Of these, 81 were occasioned by small-pox, 810 from cholera and diarrhœa, 434 by typhus, 101 by other zymotic diseases, 304 by diseases of the brain, 361 by heart disease and dropsy, 1,663 by phthisis, 790 by diseases of the lungs, 260 by diseases of the stomach and liver, 71 by diseases of the kidneys, 37 by diseases of the joints, 1813 by violent deaths, and by other causes 709.

From this we observe that violence is the most frequent cause of death. Accidental violence also incapacitates the pitmen from work oftener than any special disease or ailment. Accidents, if not immediately fatal, are not often so ultimately. During the last seven years 260 men who had got injured at work, were under my care for periods varying from one week to six months; and although many were cases of an apparently hopeless nature, all recovered but two, one of whom had organic disease, and the other went to work too soon, and partook largely of stimulants. In all those cases, many of which were compound comminuted fractures, there did not occur one single instance of pyæmia, that complication which is so common and so fatal in the accident wards of all our large hospitals. Phthisis stands next as the most prevalent cause of death. From my own experience, I should say that phthisis is not a prevalent disease amongst the pitmen of the North of England, and I have further to notice in this district the absence of the so-called black phthisis or carbonaceous lung. I asked three intelligent pitmen who had worked in Scotch mines if they could account for the prevalence of the disease there. One attributed it to imperfect ventilation, another to the heaviness of the coal dust, the third said it was partly owing to the nature of the dust and partly to the oil lamps they wore on their heads. It is interesting to note that writers on pathology have attributed this disease to each of these causes. Under the head Diseases of the Lungs, we have 790 deaths. Attacks of pleuro-pneumonia are not unfrequent, and bronchitis is common. It is rare to find an old pitman, who has moved about much from one colliery to another,

who is not short-winded. Not having had an opportunity of making *post mortem* examinations in such cases, I cannot say what the pathological state of the lung is, but we can easily conceive that the irritating nature of the gas which often is unavoidably inhaled by them may give rise to spasmodic asthma. The sudden changes of the temperature of the air they breathe also cause repeated attacks of congestion and bronchitis. The small bronchial tubes becoming obstructed, the air vesicles behind them collapse, and the surrounding healthy vesicles dilate, and so constitute the disease known as emphysema. This condition of the lung I believe to be the chief cause of the oppressed breathing of the miner. 361 deaths occur from heart disease—this seems a small proportion when we consider that the ailment just alluded to brings on heart affection, and also that the rheumatic diathesis, which prevails amongst them (not the tubercular), is such a great source of organic disease of the heart. Contrary to what we might expect, from the violent muscular exertions necessary in hewing, and from working frequently in wet and damp places, and always more or less exposed to currents of air, rheumatism and rheumatic fever do not often affect the coal hewer. Their freedom from this as well as other formidable diseases, is clearly owing to the free perspirations while at work, and the daily ablutions with soap and hot water at home. The drivers and boys are more exposed to drafts of air, and do not perspire so freely; they are, therefore, more liable to rheumatic fever, and its frequent consequence, heart disease and dropsy. The hard work and constrained position in the mine is unsuited for the youth with an enfeebled heart; he does not look sufficiently ill to excite compassion or sympathy; but, with the exception of epilepsy, there is no other disease so inimical to the poor young pitman.

Heart disease naturally leads us to the other great source of dropsical effusions—disease of the kidneys. There is nothing that a pitman complains of oftener than a pain in the back; it is sometimes so severe as to unfit him for work. I believe it to be lumbago, induced by the great strain on the muscles of that part, and in no way connected with the kidneys. I have had

occasion to treat a few cases of renal calculi, but I never saw a case of Bright's disease in a pitman. That the disease is not uncommon in the district may be known from the fact that at the time I write I have five patients under treatment for albuminuria, and three of them the wives of pitmen; and here again we find the salutary nature of the pitman's work in the mine, and his cleanly habits at home, freeing him from another formidable and fatal disorder. I fail to trace any particular liability to disease of the brain, unless the stooping position may tend to produce apoplexy. 260 deaths occur from diseases of the stomach and liver. Gastric and hepatic derangements are by no means uncommon, owing to excesses at the "pay," irregularities in diet, and smoking tobacco, but pitmen are not more liable to indisposition from these causes than tradesmen or mechanics. From diseases of the joints we have only 37 deaths out of the 7,434, showing that their joints, though hardly dealt with, do not often suffer. The deaths from zymotic diseases are not numerous, when we deduct 810 arising from cholera and diarrhœa, which prevailed as epidemics during that period. They visit much amongst each other, and a contagious epidemic is apt to spread through the whole village; but owing to the construction of the cottages, and the fires being kept constantly burning, the ventilation is good, and consequently the rate of mortality from infectious disorders is low. In my neighbourhood the trees incline towards the east, and I infer from this that the most prevalent winds are west; the rows of cottages should therefore be built running east and west. Those thus placed, and on elevated ground, were observed to be the most healthy.

But, as formerly stated, this table has been constructed from nineteen mining districts. Those districts have been classed into four groups:—1. Cornish districts; 2. Staffordshire districts; 3. Northumberland and Durham districts; and 4. South Wales districts. On examination of those groups we find the South Wales districts the most unhealthy, and the Northumberland and Durham districts the most healthy. To every 100 miners of the aggregate of the four groups of the mining districts living at fifteen years and upwards, the annual deaths are 1·811;

in Durham and Northumberland they are 1·312. We further notice from the same table that in the Durham and Northumberland districts the deaths per cent. of males, exclusive of miners, are 1·855; whilst in the South Wales districts the numbers are, for miners, 2·618; and deaths, exclusive of miners, 2·214. Thus we perceive that the per-centage of deaths of miners in the Northumberland and Durham districts is only about one-half that of the South Wales districts; also, we notice, that the per-centage of pitmen's deaths of the Northumberland and Durham districts is less than that of the males of the same district, exclusive of miners, whilst the reverse of this obtains in the South Wales districts, the per-centage of deaths of miners there being greater than that of males, exclusive of miners.

From another table in the same document of the after-life time of males of all classes at the age of twenty, we find the after-life time of males of all classes in England and Wales at twenty to be, in round numbers, 39 years. From 63 healthy country districts, 43; Cornish miners, 34; Staffordshire, 33; Durham and Northumberland, 42; South Wales, 30. Thus the miner of the North of England has an average of life three years longer than the aggregate of Englishmen; eight years longer than the Cornish miner; nine than the Staffordshire, and twelve than the South Wales miner, and only one year less than that of the men of the healthiest districts in the kingdom. But these calculations were made ten years ago, and although my experience corroborates them, it is desirable to bring some additional facts to bear on the subject, to substantiate the results of past researches, and of my own personal observations.

Within the last few days I have taken from the Registrar of the Easington Union the cause of death of every coal miner and every coal miner's son above ten years of age, who died during the last ten years. The Union has an area of 34,780 acres, and a population of 26,938; eight or nine large collieries are within it, and the number of coal-hewers is considerably above 3,000; the deaths from all causes have been 5,365; the deaths of coal miners and men who worked in or about collieries are 470; of these 35 were caused by smallpox, cholera, and fever; 33 by

disease of the brain, including apoplexy, paralysis, and tetanus; 60 from disease of the heart and dropsy; 56 from phthisis, (20 of the deaths from phthisis occured under 20 years, some had not worked underground, and some are registered as screen-men); 41 from diseases of the lungs, including bronchitis, pneumonia, and asthma; 17 from diseases of the liver; 2 from diseased joints; from abscess, hæmorrhage, and cancer, 11; 4 from disease of the kidneys; 45 from old age and exhaustion, and from violence (including 1 by suffocation; 2 by burning; 2 by feloniously cutting and stabbing)—166. We notice here the large proportion of deaths from accident, the paucity of phthisis, and the number of deaths from old age; (in addition to the 45 dying of old age, 13 of those registered as dying of heart disease, asthma, and bronchitis, were upwards of 70 years old.) Two deaths occured from joint disease; 1 from Bright's disease, and not one from the specific diseases brought on by excessive drinking. These facts, I think, must show that there is nothing in the habits and occupation of the coal miner of this neighbourhood detrimental to his health; but rather that his peculiarities, however unnatural and even indecent they may appear to some, tend to his welfare. On going to work, were he to take a full meal, his digestion, from his position, would be either entirely suspended, or unduly hurried; and if he washed prior to taking food on his return home, this process which more than anything else maintains his healthy vigour, would be less efficiently done, his stomach might suffer by its own secretion, and his appetite and digestive power would certainly diminish, and so also, if he followed the usual custom and ate his mutton first, mastication might be neglected.

Pitmen marry young, and are thus freed from a host of imaginary and real diseases which embitter the existence of thousands more fortunately placed. I would say, then, to the philanthropist—"Let well alone," and do not interfere with the *physical* condition of the miner in our northern coal-fields. A more useful and important aim would be to try to improve his *moral* state, although even in this respect he is better than he seems, and has been grossly misrepresented. The ruffian is

considered as much a ruffian in a colliery village as he could be anywhere. Much of this is due to Methodism; and however deeply we must regret the lack of confidence of a community in the established religion of their country, it is to the credit of the dignitaries of our church that they recognise the good accomplished by the exercise of means which, although they cannot approve, they do not condemn.

XVI.—*On some Fossils from the Lower Magnesian Limestone of Sunderland.* By JAMES W. KIRKBY.

THE occurrence of fossils in the lower portion of the Permian or Magnesian Limestone is so rare in the neighbourhood of Sunderland that I think it well to record the discovery of several species in the quarry of Messrs. Hartley & Co. at Bishopwearmouth.

The beds wrought at this quarry are all included in that section of the Permian series of Durham which is now usually termed the *Lower Limestone*. The *Marlslate* and the upper incoherent portion of the *Lower Red Sandstone* are also occasionally exposed, but these are not worked. Of limestone alone there is about 79 feet exposed.

The accompanying tabulated section will serve to illustrate the character of the different beds, and the exact stratigraphical position of the fossils noticed in the following remarks.

Table of Strata exposed in Hartley's Quarry, Millfield, Bishopwearmouth, in 1863.

		Ft.	In.
	Rubble, and Drift with boulders (less in thickness on south side of quarry)	20	0
Lower Limestone.	1 Dark Brown, very hard, compact limestone, much broken up	2	0
	2 Bright yellow marl, with seams of brown clay	0	10
	3 Bright yellow, soft marl, alternating with harder chocolate-hued limestones	0	8
	4*Yellow, compact limestone, harder at top than bottom, and in one thick bed	1	9
	5*Yellowish streaked with brown, soft, argillaceous limestone, rudely laminated, and very argillaceous in centre	0	7
	6 Hard, compact limestone, yellowish above, brown below	0	5

Lower Limestone.	7	Brown and yellowish, cellular, unstratified, tufa-like limestone	25	0
		(An irregular line of division.)		
	8	Grey (mottled), hard, subcrystalline, thick-bedded limestone	18	0
		(A well marked irregular line of division.)		
	9	Dark brown, pseudo-concretionary, rudely bedded limestone; thinning out to west	1	0
	10	Chocolate-hued, or chocolate mottled with brown and yellow, hard, very close-grained, ribboned limestone; very hard and crystalline at top	5	0
	11	Chocolate and brown mottled limestone of irregular structure	2	0
	12	Yellow, hard, close-grained, massive, occasionally dendritic limestone; bright chrome hued in places, and with partings of brown clay	9	0
	13	Yellow, very compact, flaggy and slaty limestone	1	9
Marlslate.	14	Yellow or brownish, earthy, laminated limestone or marlslate	1	9
	15	Yellow, soft marl	0	1
	16	Brown clay, fine and unctuous	0	1
	17	Dark grey or black shale	0	1
	18	Grey, hard marlslate; graduating into greenish grey below	1	0
	19	Marlslate: dark grey and soft at top; brownish black, tough and clayey at bottom ...	0	6
	20	Brown clay, fine and unctuous	0	1
Lower Red Sandstone.	21	Yellow sand or sandstone, with a thin, white coating on top, and very incoherent		—

This is one of the most interesting sections of the lower portion of the Permian series that occurs near Sunderland; and besides serving to illustrate the present paper, it is well worth publication on its own merits, more especially as the quarry in which it is exposed is now being filled up with rubbish.

The yellow incoherent sandstone (21), at the base of the section, is the top of the lowest Permian sub-division=the *Lower Red Sandstone*. It has only been exposed once at the bottom of the quarry.

The overlying calcareous slates (14-20) represent another member=the *Marl Slate*. It attains a thickness of three feet. The lower portion is dark grey, argillaceous, and tough; the middle portion is a lighter and greenish grey, hard, and more calcareous; the higher portion is yellow, moderately hard, and but slightly argillaceous. A band of unctuous clay runs through the centre of this marl slate, and another separates it from the underlying sandstone. From the lowest portion (the darker laminæ), I have obtained poor specimens or fragments of *Palæo-*

niscus comptus, Ag., *P. elegans*, Sedg., *P. macrophthalmus*, Ag.; also coprolitic matter full of ganoid scales; and stray obscure vegetable remains. From the middle and higher portions I have got specimens of *Ullmannina selaginoides*, Brong. These fossils, both fish and plants, are badly preserved, and not at all plentiful; indeed, after working a ton or two of the slate I did not procure a specimen fit to put into my collection, except for the sake of locality.

The ten or eleven feet of close-grained, yellow limestone (12 and 13) that follow in the ascending order, form the basal beds of the *Lower Limestone*. The upper beds are massive; the lower are thin and flaggy. The only fossils met with in them are two casts of *Producta horrida*, Sow.

Resting on the latter is about two feet of dark brown subconcretionary limestone (11). Next, five feet of chocolate-coloured, mottled with brown and yellow limestone (10), which is very hard, crystalline, and in moderately thick beds. Then, another stratum (thinning out to west) of dark brown, subconcretionary limestone (9) which has a sloping and uneven upper plane-surface, as if it had undergone some denudation. There appear to be no fossils in these beds; their absence, however, may only be apparent, for in what seems to be the equivalent of this limestone at Pallion, Offerton, Sherburn, and Moorsley, I have obtained stray examples of Entomostraca, Foraminifera, and other fossils.

Above the last named strata follow a series of beds of hard, grey limestone (8), having an aggregate thickness of about eighteen feet. This limestone is thick-bedded, and unfossiliferous; and its upper surface is sloping and irregular.

Following, is about 25 feet of a tufa-like limestone, quite unstratified, irregular in structure and hardness, and full of small cavities. This limestone is also without fossils. At first sight it would be very easy to mistake it for Sedgwick's *Cellular Limestone*, or the *Pseudo-brecciated* of King, or the *Middle Limestone* of Howse: lithologically there is nothing to distinguish it from that member ; and were it only on these grounds that its geological position could be decided, it certainly would have been

erroneously referred to a higher place in the series than it virtually holds. But fortunately additional examination shows that this deposit is so local in its distribution as to be totally absent on one side of the quarry, notwithstanding its comparatively great thickness on the other. The section here given is taken from the west side ; on the east side, the hard, grey limestone (No. 8) thickens considerably, and completely takes the place of the twenty-three feet of tufaceous limestone on the west side. Besides, the latter is seen to be superimposed by six feet of stratified limestone and marl, altogether unlike anything belonging to the *Middle Limestone*, though in some respects similar to the rocks of the *Lower Limestone*.

The strata succeeding the tufa consist of various beds of limestone and marl, as detailed in the tabular section. Those marked with an asterisk are the beds whence the fossils were obtained which are more especially the subject of this paper. Stratum 5 yielded most of the specimens. It is soft, argillaceous, and fissile. The overlying bed is more compact, less argillaceous, but softer at the bottom than at the top; the lower portion of this stratum also contained fossils. Including the former bed, and as much of the latter as has yielded fossils, the fossiliferous zone does not appear to be much over twelve inches in thickness; it being only where the limestone is most impure or argillaceous that the fossils have been found. None of the fossils retain the shell ; all are casts or impressions. And though they ought not to be described as of rare occurrence, they still require close and continued search to procure them.

The following are the species that have occurred to me :—

1. *Nautilus Freieslebeni*, Geinitz. Leonard u. Bronn Jahrb, p. 637, tab. II.

I have met with three fragmentary specimens of this species. One has a body-chamber large enough for an individual an inch and a half in diameter. All of them are crushed.

2. *Straparollus planorbites*, Münster.

This shell is discoidal in general form, the upper or spiral

portion being flat, and the lower portion widely umbilicated. The whorls are subangular, increase rapidly in size, are margined superiorly by a prominent keel externally, and by a narrow sulcus or channel internally. The surface is densely marked with fine transverse striæ. The largest specimens are $\frac{5}{16}$ths. of an inch in width and $\frac{2}{16}$ths. in height.

This is the most common of the fossils that occur. Nearly all the specimens are impressions, only one or two being casts.

When this species was first discovered in Germany, it was referred to the genus *Euomphalus* by Count Münster. It was afterwards removed from the Gasteropoda, and described as a *Serpula*, by Dr. Geinitz.(1) Baron Von Schauroth, of Coburg, next replaced it among the gasteropods in the genus *Straparollus*, of which *Euomphalus* is a synonym.(2) Since then Dr. Geinitz has again figured and described it, but still as an annelid of the genus *Serpula*.(3)

So far as my own opinion is concerned, I can only say that I see nothing that appears to support Dr. Geinitz's views as to the affinities of this fossil.(4) Its general habit is that of a gasteropod ; and it is apparently correctly placed by Münster and Schauroth in the genus *Straparollus*. Indeed, there is so great a resemblance between it and a common carboniferous species—*Straparollus carbonarius*—that I am almost persuaded they are the same.

As a British fossil *S. planorbites* has not previously been noticed in Permian strata. On the Continent it occurs in various localities in the Mergelschiefer, Unter Zechstein, and Zechstein Dolomit.

3. *Chiton Loftusianus?* King. Catalogue Org. Rem. Perm. Rocks p. 12.

Two specimens that appear to belong to this species have occurred. One is a single anterior plate, $\frac{1}{6}$th of an inch in width,

(1) Deutsch. Zechst. p. 6, pl. 3, figs. 1 & 2.
(2) Zeitschr. d. Deutschen Geolog. Gesell. Jahrg. vol. viii. (1856), p. 235, pl. xi. fig. 6.
(3) Dyas, vol. I. p. 40, pl. x. figs. 10-14.
(4) It may further be observed that Dr. Geinitz has included in his list of synonyms of this species a true annelid, which has been described by Mr. Howse and Professor King under the names of *Spirorbis globosus* and *Spirorbis helix*. This fossil, like the recent *Spirorbis*, is always found attached to foreign substances, such as the valves of *Producta horrida*, *Monotis speluncaira*, and other shells. It is also far more minute than *Straparollus planorbites*, to which it has been wrongly referred.

the other includes the anterior and adjoining intermediate plate, and has apparently belonged to an individual larger than the first.

4. *Leda speluncaria*, Geinitz. Deutsch. Zechst. p. 9, tab. 4, fig. 6.

Casts of separate valves of this shell are pretty common. They vary in size; the largest are $\frac{11}{16}$ths. of an inch in length. The hinge teeth are well shown; and the umbonal ridge is well marked, as if the individuals had been thick-shelled.

5. *Spirifera Urii*, Fleming. Hist. of Brit. Anim. p. 376.

This shell is also comparatively common; but always occurs in detached valves. Some of the specimens are extremely minute; others are larger than I have ever seen this species, being fully $\frac{5}{16}$ths. of an inch in width.

6. *Camarophoria crumena*, Martin. Petrif. Derb., p. pl. 36, fig. 4.

I have only a single fragment of this shell, but as it shows part of the ventral valve, with the arched dental plates, it quite suffices to identify it.

7. *Chonetes*, sp.

With the preceeding species have also occurred several specimens of an undoubted *Chonetes*. The largest specimens are $\frac{11}{16}$ths. of an inch in width, and $\frac{6}{16}$ths. or rather more, in length. Some are semicircular in outline; others are more oblong; the dorsal line is slightly angulate in both forms. The valves are moderately convexo-concave; and they show traces of concentric lines of growth, but none of the radiate striation that usually characterises shells of this genus. Four or five cardinal spines are placed on each flank of the umbone.

In 1856 Baron Von Schauroth described a *Chonetes* from the Mergelschiefer of Ilmenau, under the name of *C. Davidsoni*. The specimens from which he described appear to differ from mine in being less than half the size, of greater relative width, in having the surface ornamented with radiating striæ crossed with concentric lines of growth, and in possessing only three cardinal

spines on each side of the umbone. With these points of difference before me, I do not feel warranted in identifying the present species with the *C. Davidsoni*, of Schauroth. And more especially as Mr. Davidson is of opinion that it shows strong points of resemblance to the Carboniferous form *Chonetes Hardrensis*. Until we obtain examples in which the shell surface is preserved, it will scarcely be possible to determine the specific affinities of this *Chonetes*.

8. *Fenestella retiformis*, Schloth. Denkschr. d. K. Ak. d. Wiss zu München, p. 17. tab. 1, figs. 1 and 2.

This species is only found in small fragments, and not very often. The interstices are delicate, and the meshes nearly quadrate, in which respect it approaches the *var. Geinitzi* of the Unter Zechstein.

9. *Ichthyorachis anceps*, Schloth. Petrefact, p. 341.

Three or four examples of this Bryozoan have been found. They all resemble a variety that occurs in the Middle Limestone at Humbleton, in the imperfect development of the pinnules; but they differ both from that form, and every other of the species with which I am acquainted, in the regular bifurcation of the branches.

10. *Cyathocrinus ramosus*, Schloth. Denkschr. d. K. Ak. d. Wiss zu München, p. 20, tab. III., figs. 9-13, 15.

The impression of a single internode is the only trace I have of this species.

11. *Serpulites anastomosis*, sp. nov.

Beside the preceding fossils, I have also found one somewhat obscure in its relations, and apparently unknown. It may be described as a compressed tube, increasing gradually in width in one direction, and contracting in the other. The largest specimen is about one inch long, $\frac{3}{16}$ths. broad, and $\frac{1}{32}$nd. in thickness. In section it is lenticular. In three specimens the tube is straight; in a fourth example it is curved. The surface

(both of the cast and the impression) is covered with moderately fine, thread-like anastomosing, transverse striæ.

I give a name to this fossil chiefly for the sake of convenience. It would seem from its general character to belong to the *Annulata*, though to what particular group, it would perhaps be difficult to say; neither would it be wise to assert whether we have in this fossil the petrified form of *Serpulites anastomosis*, or merely that of its track or dwelling-place.

A Permian fossil that is probably nearly related to this occurs at Tunstall Hill, in Middle Limestone; at East Thickley, in Lower Limestone; at Hooten Pagnell, Yorkshire, in Lower Limestone; and at Leimnitz, near Gera, in the zechstein dolomite of Saxony. This fossil is considerably larger, and evidently a different species; but both it, and the one just described, as well as another which I have from Tunstall Hill, all appear to belong to animals that made tracks in the limestone mud of the Permian period. The Saxon specimens have been described by Dr. Geinitz as a plant under the name of *Palæophycus insignis*.[5]

The first of the above fossils which I found were the *Straparollus* and the *Chonetes*, neither of which I had ever met with in Permian rocks before. The Carboniferous facies of these forms almost caused me at first to suppose that I had come upon a colony of Carboniferous recurrents. Further search, however, brought to light better known Permian species, such as *Leda speluncaria* and *Spirifera Urii*, which somewhat modified my first thoughts. Nevertheless, *Sp. Urii* is a Carboniferous recurrent, and so is *Camarophoria crumena* and *Fenestella retiformis*, which, with the *Chonetes* and *Straparollus*, form about half of the species found—so that there may still be something in the idea first originated.

But putting aside all ideas of the Carboniferous descent of this local fauna, I may nevertheless remark that it differs as a group of Permian species from all other groups with which I am acquainted. The prevailing species are either wholly new to Britain, or such as are comparatively rare in other localities where they occur. And such of the Permian types as are

(5) Dyas, vol. II.

almost invariably present wherever the Lower and Middle Limestones are fossiliferous, are mostly absent; and the one or two which are present are extremely rare.

Whatever may have been the originating cause of this difference in the distribution of the Lower Limestone fossils, it is, I think, evident that there existed even in the Permian period distinctions in the geographical distribution of species, analogous to those we observe in the faunæ of recent seas. Nor is this the only instance that occurs among Permian fossils, that might be quoted against the still prevalent notion that the distribution of palæozoic marine life was essentially different, in the wider or almost universal range of species, from that of existing marine life. For though the Permian species of Britain certainly form one general fauna, they yet occur under such different arrangements in the various districts where Permian rocks are found, as to show that the old palæozoic sea, wherein these rocks originated, was not peopled throughout its whole area by precisely the same arrangement or grouping of species. For instance, while the floor of the Lower Limestone sea in Durham was covered with one or more groups of species, the floor of the same sea in South Yorkshire was peopled by a different group, or at least by one so dissimilarly constituted as not to have one prevailing species in common. This is not the place for me to enter further into the details of the question, else I could easily have mentioned other examples. I will only add that I am not disposed to look upon the fauna or faunæ of the Permian period as peculiar in this respect, for I believe the other palæozoic faunæ have only to be studied with a little philosophy in order to bring to light similar differences and peculiarities in the distribution of species.

XVII.—*On the occurrence of Fossils in the highest beds of the Durham Coal Measures.* By James W. Kirkby.

Some two or three years ago Mr. Vint of Sunderland showed me, from his collection, a small piece of ironstone the surface of which was crowded with impressions of a rather minute, ovate or nearly circular shell. This specimen had been collected by him

about thirty years before, from some forgotten locality on the south bank of the Wear, west of Hylton. It had subsequently been examined by Professor Phillips, who referred, or was disposed to refer, the shells to a species of *Ancylus*, or river limpet. No further notice appears to have been taken of the discovery for several years, though the previous existence of this genus in the coal measures—or even in any formation older than Tertiary —had not been recorded.

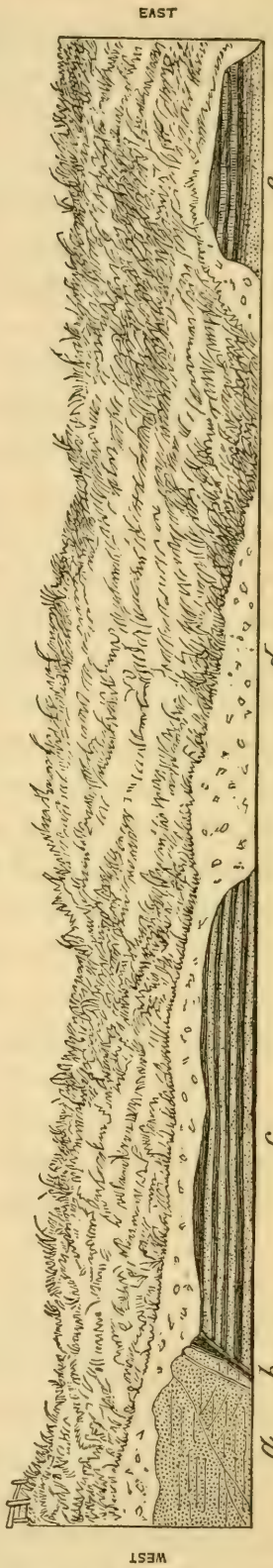
Until the spring of 1863, Mr. Vint's specimen remained the only one of this interesting fossil; the lost locality not having turned up, either in the memory of Mr. Vint, or by independent discovery. But one day last spring, while examining the northern bank of the Wear, opposite to Claxheugh, about two miles west of Sunderland, I came upon a band of ironstone, associated with shale, which contained Mr. Vint's *Ancylus* in great quantities; and in the shale underlying the ironstone I also found the same fossil somewhat differently preserved, and not in such numbers as in the ironstone itself.

A rather hasty study of the materials thus acquired led me to conclude that the fossil was not an *Ancylus*, but an *Estheria*, and hence an Entomostracan. But Professor T. Rupert Jones to whom I submitted some of my specimens, differs from my opinion. Both he and Mr. T. Davidson, in fact, are persuaded that the fossil in question is a Brachiopod of the genus *Discina*. Which of these opinions is the true one, I scarcely feel competent to say. But whether the fossil be an Ancylus, a Discina, or an Estheria, its occurrence is of interest in Carboniferous palaeontology; and instead of prematurely attempting to determine its true relations, let me rather give some particulars of its character and mode of occurrence.

About two miles west of Sunderland a fault crosses the Wear in a northerly direction, and brings up the Coal Measures into sections where there otherwise would have been only the rocks of the Permian series. The former strata may be seen on each bank of the river; but their exposure is best seen on the north bank, where a series of impure sandstones intercalated with light grey, arenaceous shales with fossils belonging to *Neuropteris* and *Cala-*

mites, are faulted against the yellow incoherent portion of the Permian Lower Red Sandstone, as represented in the accompanying wood-cut. About sixty yards to the east of the line of fault, some seven or eight yards of grey shale form a low scarp, which is capped by a sloping bank of drift, partly over-grown with brushwood.* The shale rests upon a bed of yellowish grey sandstone, and is dark grey in colour, of very fine texture, and fissile. Intercalated with it are two or three thin, irregular bands of brownish grey ironstone. In the uppermost of these the fossil just mentioned occurs in great abundance; on some planes it literally covers the whole surface, so as to prevent any of the matrix being visible. In the shale, or a portion of it, underlying the ironstone, the same fossil is also found, and though plentiful enough there, it is yet not so gregarious in its occurrence as in the ironstone.

In the ironstone it is from $\frac{1}{12}$th. to $\frac{1}{8}$th. of an inch in length, and a little less in width. It is usually more



Section of Permian and Coal Measure Strata on the north bank of the Wear opposite Claxheugh.

a. Lower Red Sandstone (Permian). *b*. Fault. *c*. Light grey shale with thin beds of sandstone (Coal Measures). *d*. Drift. *e*. Yellowish grey sandstone, overlaid with dark grey shale with bands of ironstone, containing *Ancylus Vinti*.

* To mark the locality with exactness, I may observe that the 25th mere stone of the River Wear Commissioners is fixed immediately in front of it.

or less ovate or oval, flatly convex or patelliform, and with a sort of blunt, reflexed apex or umbo eccentrically placed near one extremity. The shell is extremely delicate and more or less irregularly wrinkled by compression; but besides the wrinkles due to this cause, the surface is ornamented by a series of regular, concentric ridges or plaits, which have the umbo for their centre. This is the general character of the fossil when seen congregated in groups on the plane surfaces of the ironstone. But on closely examining isolated individuals in other parts of the matrix, so as to see clearly the true marginal outline, we perceive that one part of the margin is straight—as though it were a hinge line, and that the apex or umbo is more decidedly eccentric than the congregated specimens appear to show. Examples from the shale, which occur as extremely delicate, black, occasionally iridescent films, also show with great clearness the straight border and eccentric umbo, as well as the features previously mentioned.

It is the last named characters—the straight margin and eccentric umbo that give to this fossil its strong resemblance to *Estheria*. And it is these that cause me still to have a sort of half belief in my old opinion. But as this is contrary to the views of Professor Jones, who possesses a thorough knowledge of the *Estheriæ* both fossil and recent, I feel satisfied I must be wrong. On the other hand I do not think it is a *Discina*, on account of its straight border and eccentric umbo. The vegetable remains with which it is associated also oppose the idea of its being a marine shell. For the present, therefore, it will be as well perhaps to retain as a provisional name, Professor Phillips' term of *Ancylus*. This I propose, chiefly to get rid of the evil of having an unnamed fossil—which perhaps is the next greatest evil to that of having a fossil with too many names—and not because I am of the opinion that it really belongs to *Ancylus*. For whether it be an entomostracan or a mollusc, the evidence certainly would appear to go towards proving that it had a bivalvular, rather than a univalvular carapace. Taking for its specific name that of its original discoverer, Mr. Vint, I would describe it in the following words:—

Ancylus? Vinti, n. sp.

Length $\frac{1}{12}$th. to $\frac{1}{8}$th. of an inch; breadth $\frac{1}{14}$th. to $\frac{1}{10}$th. of an inch. Sub-oval or nearly circular, with the posterior margin straight, flatly patelliform, with an eccentric, reflexed apex posteriorly placed, shell delicate, surface ornamented with several rather coarse concentric plaits.

In the ironstone there were associated with the *Ancylus*, specimens of *Beyrichia arcuata*, Bean; and of another small Entomostracan related to *Cythere* or *Cypris*; also a few fish scales, and rarely, examples of *Anthracomya acuta*, which is very plentiful in one of the ironstone bands below; vegetable remains, some of which belong to *Neuropteris* and *Asterophyllites* also occur in the same bed as the *Ancylus*. *Beyrichia arcuata* and a few ganoid scales occur in the shale.

A little further to the east, and, of course, a little higher in stratigraphical position, fish remains are more plentiful in a bed of black, carbonaceous shale. From it I have obtained two kinds of small ganoid scales,—one coarsely striate and with a serrated margin; the other with a plain margin and a more finely striated surface; both of which probably belong to species of *Amblyterus*. Also the scales of a small *Holoptychius* or *Cœlacanthus*; the teeth of *Diplodus gibbosus*; the ramus of a minute maxillary; and a smooth bony spine about an inch long, and with an oval or nearly lenticular transverse section. The same shale moreover contains some extremely delicate and obscure films of the size and shape of the *Ancylus*, though differing somewhat from that fossil in approaching still nearer to *Estheria*.

Further to the west, between the fault and the *Ancylus* bed, and below high water mark, another bed occurs, containing fish remains. This stratum, which appears to be of no great thickness, may be described as a highly carbonaceous sandstone,—the arenaceous matter of the rock being extensively and irregularly intercalated with flakes of coal. Casts of large scales, spines, and bones are very plentiful in it; mineral charcoal and vegetable remains being associated.

I have little doubt that both the latter beds would yield fossils of some value could they be fairly examined, which scarcely can

be done opposite to Claxheugh, owing to the smallness of their exposure. The position, both of this and the *Ancylus* bed is very high in the Durham Coal Measures; almost higher indeed than animal fossils have previously been found. As the amount of fault which throws these strata up is not more than thirteen fathoms in the neighbouring colliery of Monkwearmouth, their stratigraphical position cannot be much over fifty or sixty feet from the top of the Coal Measures, or from the base of the Lower Red Sandstone.

XVIII.—*Coleopterous Insects added to the Fauna of Northumberland and Durham, in* 1863. By Thomas John Bold.

1. Trechus obtusus, *Erichson.*

Rye, Entomologist's Annual, 1864, 33, 2.

Not rare in our district; principally affecting woods, and living amongst the fallen leaves. I have also found it to frequent recently mown grass, by wood sides. It occurs all through the summer.

2. Bembidium [Tachys] Fockii, *Hummel.*

Rye, *l. c.* 34, 3.

New to the British Fauna. Six specimens, taken near South Shields, are the only known British examples of this scarce and curious creature.

3. Ischnoglossa corticalis, *Steph.*

I. rufopicea, Kraatz, Insecten Deutschlands, ii. 59 2.

Taken by the Rev. R. Kirwood, at Saltwell.

4. I. corticina, *Erich.*

Kraatz, *l. c.* 59, 3.

Both these insects appear to be very rare, and only single specimens have been taken of each. The last I took at Gosforth.

5. Ilyobates nigricollis, *Payk.*

Kraatz, *l. c.* 134, 1.

Rare; taken on the sands between Whitley and Hartley in May.

6. TACHYUSA SULCATA, *Kiesenw.*

Fairmaire et Laboulbene, Faune Francaise, i. 375, 9.

Beneath Algæ, on the coast, near Hartley; but rarely. Occurring to me in October.

7. OXYPODA PRÆCOX, *Erich.*

Waterhouse, Catalogue, 17, 8.

Near South Shields. Very rare.

8. O. NIGRINA, *Waterhouse.*

O. incrassata, Kraatz, *l. c.* 181, 30?

Also very rare. South Shields, and Hartley.

9. HOMALOTA* CURRAX, *Kraatz.*

Kraatz, *l. c.* 198, 1.

Ouseburn, April. I have also found it amongst debris, after floods, in other places.

10. H. VICINA, *Steph.*

Kraatz, *l. c.* 209, 12.

A distinct, and well marked species, differing from nearly all the species of this intricate genus, in being easy to determine.

11. H. PLANIFRONS, *Waterh.*

Rye, *l. c.* 41, 11.

Of this new species I took a pair, male and female, on the shore near South Shields. The male has the mouth much produced.

12. H. HYGROTOPORA, *Kraatz.*

Kraatz, *l. c.* 220, 20.

Gosforth, rare: more plentiful in company with *H. currax* in Cumberland.

13. H. PLUMBEA, *Waterh.*

Two specimens from the sea coast, near Hartley.

14. H. PUNTICEPS, *Thomson.*

Rye, *l. c.* 42. *H. Algæ*, Hardy and Bold.

Not rare, amongst Algæ, on the sea coast.

* To Mr. Waterhouse our fauna stands indebted for the determination of the species of this most difficult genus, and which but for his great kindness must have remained a confused mass of doubts.

15. H. MARITIMA, *Waterh.*

Rye, *l. c.* 43. *Ho. Algæ var.*, Hardy and Bold.

Equally as abundant as the preceding, from which it has, most judiciously, been separated by Mr. Waterhouse.

16. H. OCCULTA, *Er.*

Kraatz, *l. c.* 233, 34.

Very rarely, at Long Benton in May.

17. H. GEMINA, *Erichs.*

Kraatz, *l. c.* 255, 59.

Also very rare and local.

18. H. XANTHOPTERA, *Steph.*

H. merdaria, Kraatz, *l. c.* 269, 77.

In Agarics, exceedingly abundant throughout our district.

19. H. EURYPTERA, *Steph.*

H. validicornis, Kraatz, *l. c.* 271, 78.

In the same locality as the last, but much rarer.

20. H. TRINOTATA, *Thoms.*

Kraatz, *l. c.* 272, 76.

With the preceding: not common.

21. H. NIGRICORNIS, *Steph.*

Kraatz, *l. c.* 274, 82.

Not rare. I have examples from Gosforth, Bothal, and other places.

22. H. SODALIS, *Erichs.*

Kraatz, *l. c.* 279, 86.

Gosforth, but rarely.

23. H. THOMSONI, *Janson.*

H. nigricornis, Kraatz, *l. c.* 281, 88.

Very rare: specimens taken at Gosforth and Hartley, in April and May.

24. H. NIGRA, *Kraatz.*

Kraatz, *l. c.* 287, 95.

Not uncommon in the early part of summer. I have examples taken at Long Benton, Tynemouth, Cullercoats, and Hartley.

25. H. VILLOSULA, *Kraatz.*
Kraatz, *l. c.* 305, 116.
Taken at Long Benton in May. Likewise at Saltwell, by the Rev. R. Kirwood.

26. H. ATRAMENTARIA, *Gyll.*
Kraatz, *l. c.* 303, 114.
Exceedingly abundant, frequenting dung, dead animals, and vegetable refuse.

27. H. LEPIDA, *Kraatz.*
Kraatz, *l. c.* 309, 120.
Rare, and very local.

28. H. ATERRIMA, *Grav.*
Kraatz, *l. c.* 313 123.
Apparently very rare.

29. H. LATICOLLIS, *Steph.*
H. vernacula, Kraatz, *l. c.* 315, 126.
Also rare: North Seaton, July.

30. H. PICIPES, *Steph.*
Wat. Cat. 19, 78.
Long Benton, September.

31. H. CLIENTULA, *Erich.*
Kraatz, *l. c.* 322, 135.
Very rarely: at Gosforth, and North Seaton.

32. TACHYPORUS SCITULUS, *Erich.*
Kraatz, *l. c.* 426, 12.
Long Benton. Rare, October.

33. BRYROPORUS (?) CASTANEUS, *Hardy and Bold.*
Rye, *l. c.* 49, 23. *Boletobius castaneus*, Catalogue p. 107.
My specimen of this insect, being quite distinct from *Megacronus castaneus*, Stephens, has been raised to specific rank by Mr. Waterhouse. (See Proceedings of the Entomological Society of London, March 1, 1863.)

34. MYCETEPORUS NANUS, *Grav.*
Rye, *l. c.* 52, 25.
New to the British Fauna. Taken on the sea coast, between Whitley and Hartley.

35. PHILONTHUS SUCCICOLA, *Thomson.*

Rye, *l. c.* 54, 27. *Ph. carbonarius*, Catalogue.

Mr. Rye has pointed out that our British insect is not the *Ph. carbonarius.* Gyll., but the *Ph. succicola* of Thomson's Skandinaviens Coleoptera, ii. 157, 7.

36. PHILONTHUS EBENINUS, *Grav.*

Kraatz, *l. c.* 596, 30.

Not rare, occurring all over our district. It varies greatly both in size and colour.

37. PH. THERMARUM, *Aube.*

Kraatz, *l. c.* 608, 44.

Very rarely, at Long Benton. It has also occurred to the Rev. R. Kirwood.

38. PH. PROCERULUS, *Erichs.*

Kraatz, *l. c.* 624, 65.

Rare: two specimens taken on the sands near Hartley, May.

39. LATHROBIUM GEMINUM, *Kraatz.*

Kraatz, *l. c.* 673, 3.

Equally abundant, and frequenting the same places as *elongatum*, with which it has been confounded in collections.

40. LITHOCHARIS OBSOLETA, *Nordm.*

Kraatz, *l. c.* 719, 14.

A single example, taken near South Shields, in May.

41. STENUS ARGUS, *Grav.*

Kraatz, *l. c.* 770, 35.

I have a single specimen of this insect, taken in the district, but the exact locality I had omitted to note.

42. S. DECLARATUS, *Erichs.*

Kraatz, *l. c.* 774, 41.

A well marked and abundant species, which occurs all over our district.

43. S. GONYMELAS, *Steph.*

S. subœneus, Kraatz, *l. c.* 786, 57.

Mixed in our local collections with *Ossium*, from which, however, it is abundantly distinct.

44. Bledius longulus, *Erich.*

Kraatz, *l. c.* 830, 14.

Not rare in the sand holes on the sea coast, near Hartley. A nearly allied and new British species, *B. erraticus*, Erichson, recorded in the Annual, for 1864, by Mr. Rye, will most likely be found within our bounds. I took a series of it some years ago, in the bed of the river Irthing, near Lanercost, Cumberland, but had confounded it with, and sent it to correspondents as *B. opacus;* and as such it would have remained but for the quick eye of my friend Rye, who continues to "detect" very many novelties which escape our duller vision.

45. Trogophlœus elongatulus, *Erichs.*

Kraatz, *l. c.* 874, 6.

Rare: amongst Algæ, on the coast near Hartley.

46. Omalium allardi, *Fairm.*

Rye, Ent. Ann. 1863, 88, 60.

This new British species has been taken at Hartley, Long Benton, and even in the centre of Newcastle.

47. O. vile, *Erichs.*

Kraatz, *l. c.* 993, 23.

Gosforth and elsewhere; by no means rare, often sheltering beneath bark.

48. Acritus minutus, *Payk.*

Hister minutus, Gyll. Ins. Succ. 1, 99, 31.

Hitherto confounded with *Abræus globosus*, in my collection, from which it is abundantly distinct. It abounds on hot-beds, and in other places.

49. Rhizophagus crybratus, *Gyll.*

Gyll. *l. c.* iv. 637.

Apparently rare. Taken by the Rev. R. Kirwood, at Houshel, in March.

50. Philhydrus nigricans, *Zett.*

Rye, *l. c.* 68.

Rare. I have specimens from Gosforth, and from Cheviot.

51. Aphodius puncto-sulcatus, *Sturm.*

Erichson, Insecten, ii. 872, 54.

Not rare during the spring months on the sands near South Shields. I also met with it in October, at Long Benton.

52. Cis festivus, *Panz.*

Gyll. *l. c.* iii. 381, 4.

Rare : Ouseburn dene. I have taken it also in Cumberland.

53. Octotemnus glabriculus, *Gyll.*

Cis glabriculus, Gyll. *l. c.* iv. 629.

Exceedingly common in Boleti. Hitherto it has done duty in our collections as *Cis nitidus*, from which, however, it may readily be separated by the fewer joints in the antenna.

54. Tomicus calcographus, *Linn.*

Bostrichus calcographus, Gyll. *l. c.* iii. 358, 6.

Sunderland, Rev. R. Kirwood.

XIX.—*On some Fish Remains from the Durham and Northumberland Coal Measures.* By J. W. Kirkby and Thomas Atthey. [Plate VI.]

The fossils described in this communication form part of an extensive suite which we have collected from the coal measures of Northumberland and Durham. Our collection includes both animal and vegetable remains, the former, however, preponderating.

The vegetable fossils of this coal-field are, of course, already well known by the researches of Messrs. Lindley and Hutton. They have, moreover, been subjected to additional investigation since the great work of the latter authors was published; and even now researches are being carried on by Messrs. Howse and Taylor with the object of arriving at a correct knowledge of the relationships that exist between these fossils and the Carboniferous floras of foreign countries.

Little, on the other hand, has been done towards elucidating the animal fossils that occur along with the plants in the coal strata of the two counties. Professor King has certainly published a paper on the *Anthrocosidæ* occurring in this formation;

and occasional mention has been made of the occurrence of the scales and teeth of fish; but still no one has taken up the subject as a matter for careful and systematic investigation. We therefore intend that the present paper shall be the first of a series descriptive and illustrative of these fossils. In this series of papers, which we hope from time to time to contribute to the Transactions of the Society, we propose to describe or notice all the fossils belonging to the animal kingdom that we have found, or that are known to occur, in the Durham and Northumberland coal measures. We confess that we feel some reluctance to engage in so serious an undertaking,—being satisfied that the subject requires for its proper treatment far greater ability than we in anywise can pretend to. Had it not, indeed, been for the conviction that an account of these fossils is a great *desideratum* in the palæontology of the two counties, and because we believe that our collection is the most comprehensive that has yet been obtained, we should not have presumed to have attempted their description.

The fossils forming our collection include numerous remains of fish belonging to the genera *Rhizodus*, *Megalichthys*, *Holoptychius*, *Acrolepis* (?), *Pleuracanthus*, *Orthacanthus*, *Gyracanthus*, *Ctenoptychius*, *Diplodus*, *Ceratodus*, *Platysomus*, *Cœlacanthus*, *Palæoniscus*, &c., &c.; and of several species of *Mollusca*, *Insecta*, *Entomostraca*, and *Annulata*. Some of these fossils have already been incidentally mentioned by other observers as belonging to this coal-field, but the majority have not yet been recorded as occurring in it; others, again, appear to be new, not only to this coal-field but to the rocks of the Carboniferous system generally.

The great bulk of the fossils have been obtained at Newsham Colliery, from a thin stratum of highly carbonaceous black shale—commonly called "black stone"—lying immediately over the Low Main Coal. The same stratum has been identified in several of the adjoining collieries, and has thus been proved to extend over an area of many square miles. But whether it is coextensive with the well known coal seam which it overlies, or whether it is merely a local deposit, peculiar to the region immediately surrounding the first named locality, are points

which have not yet been satisfactorily determined. At the other collieries where we have had opportunities of examining the stratum it is certainly not near so fossiliferous in fish-remains as it is at Newsham; and from it also decreasing in thickness as we recede from the latter point, it would almost appear as if it did not extend its area much beyond its already ascertained limits. But however this may be, we feel confident that there must be other localities in the coal-field where these fossils occur in comparative abundance. We are, indeed, already aware of other localities where they do occur, at horizons both above and below that of the Low Main.

Certain of these, we hope ultimately to work to some profit; but what we more especially look forward to is the discovery of other localities where the fossils are preserved in a more satisfactory condition than they have yet occurred to us. For it may be observed that those we propose to describe are nearly all in a fragmentary state. Detached teeth or detached mandibular and maxillary bones with teeth, other cranio-facial bones and plates, bones belonging to the vertebral column and fins, scales, fin-spines and smaller dermal spines are, with one or two exceptions, the fossils we have hitherto found. Occasionally an irregular patch of scales and bones occurs which appears to represent all the parts of a fish; but we have only met with two specimens whose integrity has been so well preserved as to indicate the original contour of the individual when alive. The remains of many of the species—more particularly of the Placoideans—we, of course, cannot expect to find much more entire than they have already occurred; but others belonging to the Ganoidei we certainly do expect to meet with in new localities as beautifully preserved and entire individuals, like the Permian fish in the Marl slate and Upper Limestone.

The fossils which we have selected for notice in the present paper belong to species that are new to this coal-field. And it may be observed that we have been assisted by Sir Philip de Grey Egerton in the determination of them.

ORDER. GANOIDEI.

FAMILY. GLYPTODIPTERINI.

GENUS. RHIZODUS, *Owen.*

1. RHIZODUS LANCIFORMIS, *Newberry.* Pl. VI., Figs. 1, 2, 3.

Several teeth and a portion of one ramus of the mandible of this species have occurred to us.

The teeth, by which the species is best known, are from $\frac{6}{8}$ths. of an inch to an inch in length; from $\frac{2}{8}$ths. to $\frac{5}{16}$ths. in width; and about $\frac{1}{16}$th. in thickness medianly. They are lancet shaped, acutely pointed, and with sharp, cutting edges; one edge is more convex than the other, and that which is least convex is most trenchant; the median portion is swollen or flatly convex; the lateral portions are slightly concave; the base appears to have been finely plicated; the rest of the surface is smooth; the cross section elliptical.

The fragment of the mandibular bone is about 3 inches long, and $1\frac{1}{2}$ inch broad. Portions of two (?) teeth are shown in the interior, but both seem to be displaced. The external surface is sculptured in a bold, rugose sort of pattern, the ridges of the wrinkling being comparatively narrow and sharp, and the intervening furrows wide and shallow.

Localities.—Newsham and West Cramlington. It occurs also in the Coal Measures of North Staffordshire, Nova Scotia, and Ohio.

GENUS. HOLOPTYCHIUS, *Agassiz.*

2. HOLOPTYCHIUS SAUROIDES, *Agassiz.* Pl. VI., Figs. 5 & 6.

The teeth of this species are usually found detached, but we have one specimen showing four of them fixed to a portion of the right ramus of the mandible. This fragment which shows the extremity, is $2\frac{3}{4}$ inches long, $\frac{15}{16}$ths. of an inch high, and $\frac{7}{16}$ths. thick. Its external surface is irregularly swollen and densely covered with minute and somewhat irregular tubercles. A large laniary tooth, about 1 inch long, is placed on a protuberance near its extremity, with a smaller one, $\frac{7}{16}$ths. long, before it, and two others, $\frac{12}{16}$ths. in length, placed together about $1\frac{3}{4}$ inches behind it. The space between the latter and

the large tooth shows indications of having been occupied by others which have been displaced. The large laniary is conical, rather compressed laterally, not very sharply pointed,* reflexed until near the extremity when it is directed straight upwards; it is ornamented on the sides and behind with distant, raised, longitudinal striæ or delicate ribs, from the base to near the point; about the point and in front it is smooth. The other teeth resemble this in general character, but are not so strongly reflexed, rather more sharply pointed and rounder.

Localities.—The teeth of this species have occurred to us at Newsham, and at Monkwearmouth in black stone from the roof of the Hutton (?) seam.

3. Holoptychius, sp. indet. Pl. VI., Fig. 4.

Fig. 6 represents an imperfect mandibular bone, armed with conical teeth, apparently belonging to a small *Holoptychius*. The articular extremity is wanting; the rest of the bone up to its junction with the opposite ramus is complete. It is $\frac{6}{8}$ths. of an inch in length, and $\frac{1}{8}$th. or less in height. A large conical, reflexed tooth is placed near to the extremity, with a small one immediately in front. Behind the large tooth are two others of about half the size; then follow six smaller teeth only one-fourth the size of the largest. All the teeth except the largest are smooth, but slightly reflexed, and appear to be arranged in pairs. The large tooth is covered on the sides and behind with rather coarse, inosculating, longitudinal striæ. The external surface of the bone is covered with a sort of rugose ornamentation which towards the extremity becomes more tuberculous in character.

Locality.—Newsham.

EXPLANATION OF PLATE VI.

Fig. 1 *Rhizodus lanciformis*, interior of fragment of mandible.
2 „ external view of same.
3 „ tooth twice natural size.
4 *Holoptychius*, sp. indet. ramus of mandible.
5 *Holoptychius sauroides*, portion of mandible, internal aspect.
6 „ tooth natural size.

* The enlarged view of the tooth of this species, given in the Plate (Fig. 6), represents it rather too bluntly pointed.

XX.—*On the Fossil Teeth of a Horse found in the red clay at Stockton.* By John Hogg, M.A., &c.*

On exhibiting three molar teeth of a horse, I will only make a few brief remarks; and this I am induced to do because Mr. Richard Howse, in his paper "On the Fossil remains of Mammalia found in Northumberland and Durham," printed in the Transactions of the Tyneside Naturalists' Field Club, vol. v., part 2, two years ago, says there are, "very few instances yet put on record of the occurrence of mammalia in a fossil state in those counties" (p. 111).

He then gives the following account of

"No. 3.—Horse, *Equus* ——"

without either naming, or conjecturing the species.

"Two molars belonging to the under jaw of a Horse have been discovered by Mr. Atthey in the peat deposit at Preswick Car, in Northumberland, but more perfect information is desirable, in order to be able to attest the antiquity of the species" (p 113).

The three molar teeth, now exhibited, were dug up four or five feet below ground imbedded in red clay, three or four years since, by some workmen whilst cutting a drain near the south end of the town of Stockton-on-Tees. Other teeth were also found there, but I have not seen them, and the under-jaw itself was broken and destroyed.

Professor Owen, in his "History of British Fossil Mammalia," mentions, at p. 388, a fossil horse molar tooth from the lower jaw, with "a grinding surface one inch five lines in the long diameter, and eight lines in the short diameter." Again he adds, p. 390, "Mr. Fitch has a lower molar tooth three and a half inches in length, found in Norfolk Pliocene deposits."

By comparing my specimens with those, I find two of the teeth to be just three inches in length in their present state, but the third tooth is three and a quarter inches long, and it has evidently been longer. The grinding surface is one and one-eighth of an inch in both long and short diameters of the two

* This paper was read also to the Section C. (Geology), of the British Association, at Newcastle.

larger teeth, but of the smaller one, it is only one inch in both diameters.

I also exhibit, for the sake of comparison, three more teeth of a Horse, which I found in a sandy field called Newton Heads, at Norton, near Stockton, on November 5th, last, where a deep hole had been dug; and close to the same spot, in another hole, upon the same day, a fragment of a human skull. As many human bones have been discovered during many years past in the same field—which is mentioned in a paper I read to the sub-section "Ethnology" of the British Association at Swansea, in 1848, and recorded in the Report of that year, it is supposed, according to local history, that a battle had taken place there some centuries ago; if so, the horse was probably there interred with his slain rider.

These teeth do not exceed two and a half inches in length, and the grinding surface in all is one inch, in both of their diameters.

And it will be seen that the external conditions of the teeth are very different; in the Stockton specimens they have a harder and a highly polished surface, which is wanting in the Norton teeth.

Again, I have brought two molar teeth of the existing ordinary horse, from which it will be noticed that the long diameter of the grinding surface in both, is one and one-eighth inches, and the short diameters are seven-eighths and six-eighths—but their lengths are three inches, and two and three-fourths inches respectively.

In the Fossil room of the British Museum I saw very recently some teeth of the *Equus fossilis*, which corresponded apparently with the three Stockton specimens in their size, colour, and glazed appearance.

Specimens of the Stockton fossil teeth, and of the Norton (Newton Heads), more modern teeth, are now deposited in the Museum of the Natural History Society, Newcastle.

XXI.—*On Proliferous Cones of the Common Larch.* By John Hogg, M.A., F.R.S., &c.*

I beg to exhibit several specimens of the cones of the Common Larch (*Larix Europœa*), which present a remarkable mode of growth. The first time that I observed this abnormal growth was in a plantation of young larches, in the autumn of 1858, when I found only two small specimens, in which the stem, or stalk, of the cone had grown through the cone itself to one and a half, or two inches in length.

The specimens which I now exhibit were gathered by myself in another young plantation from many different trees last October; some of the stems, which have lengthened into strong shoots, from the apices of the cones, have grown to eight or even ten and a half inches in length, or rather, I might say, that the stems had grown through the cones to those extraordinary lengths; and as they appeared perfectly healthy and well covered with buds and leaves, they would doubtless continue to enlarge into branches, and the cones themselves drop off or decay. This proliferous condition I was at first inclined to attribute to disease; but from the healthy appearance of the branches, I am now satisfied that it originated in an exuberance of growth, which in all likelihood was increased, if not caused, by the rainy summer of last year.

Further, I exhibit several apparently similar forms in the young shoots of some young trees of the Norway Spruce Fir (*Abies excelsa*), which I obtained last October in the same plantation. On examination, however, the cone-like protuberances will be seen to be quite different, as in fact, they are not cones, but the cysts, or cells of insects. A description of them, with a wood-cut, will be found in Selby's "History of British Forest Trees," p. 465, where he calls them the "nidi of an aphis."

In a letter to Sir William Hooker, I said—"I intend to cut one of the Larch cones longitudinally, so as to trace the connexion of the stalk through the interior of it." In his answer,

* This paper was read also to t e Section D, (Zoology and Botany) of the British Association, at Newcastle.

Sir William kindly sent me a little sketch, giving an ideal longitudinal section of one of the Larch cones, so as to show how he conceived the stalk to continue its growth directly, and without any division, through the length of the cone. I had three of those proliferous cones sawn through longitudinally, and the results (as exhibited) prove the correctness of Sir William Hooker's imaginary sketch. None of the cones seem at all diseased, and the seeds are progressing towards their natural maturity.

Postscript.—The President of the Section (Professor Balfour) after the reading of my paper, remarked that he had seen, in some foreign work, published many years ago, an engraving and a notice of this proliferous Larch cone, and he thought that it would very probably be mentioned in De Candolle's "Organographie Végétale."

Having met with a copy of this work in the Library of the Literary and Philosophical Society, Newcastle, I saw that fig. 3, in plate 36, Tome 2 (Paris, 1827), represents this smaller state of the Larch cone—which De Candolle terms, "monstruosité," and he merely describes it as, "axe du cone *prolongé enbranche.*"

And I may further add that, on examining the same young Larches, which are growing in a light gravelly soil, and which produced so many proliferous cones last season, I found that they were all this autumn (September 23rd) barren; and indeed I failed to detect any fresh cones of this year's growth upon any of the trees, which had, nevertheless, grown well during the latter part of the past warm summer.

XXII.—*Meteorological Report for* 1863. Edited by George Clayton Atkinson, Esq.

Having been requested to tabulate the returns handed in by various contributors, of rain, wind, and temperature, in the year 1863, for publication in the "Transactions of the Tyneside Naturalists' Field Club," my endeavour has been so to group them, as to present means or averages of portions of the district which are similarly situated. This mode makes one set of observations a check upon another; leading to a well-grounded reliance on those which nearly coincide, as well as to a reasonable hesitation in accepting those which do not.

On inspecting the nineteen different returns of rain in the annexed table, I think we may safely consider, that with the exception of Darlington and Howick, they bear the appearance of correctness and reliability; these two are so much below their neighbours, that it will be prudent not to use them for any estimates of the average fall of rain. Deducting these, the districts ranged in the order of increase of fall, shew the following results:—

The Coast District	5 stations	24·63 inches		
The Southern do.	2 „	25·16 „	}	=26·29
The Northern do.	3 „	27·44 „		
The Newcastle do.	4 „	27·94 „		
The North Tyne do.	2 „	44·19 „		
The Allenheads do.	1 „	54·01 „		

The coast district, being decidedly the dryest, and a gradual increase in fall being apparent in pursuing the coast from north to south. Thus at

Cresswell, the fall was	.....	21·38
North Shields „	.....	24·74
Sunderland „	.....	24·93
Hendon Hill „	.....	25·93
Seaham „	.....	26·15

The wettest month in the year was June; the greatest amount of rain in twenty-four hours was registered on the morning of the 11th of that month, and amounted

At Wylam, to	1·44 inches.
At Durham, to	1·11 „
At North Shields, to	1·07 „

The dryest month, was—as usual—February. Very little snow fell during the year. At Wylam, when reduced to water, it amounted to only 1·59 inches.*

The total rain for the year was slightly above the average quantity of the last eight years. Thus, for six stations, we have at:—

	Average fall for eight years, including 1863.	Fall in 1863.	Difference of 1863.
Durham	22·88	24·09	+1·20
Benwell	27·92	28·49	+0·57
Wylam	25·63	28·39	+2·76
Stamfordham	29·38	28·60	—0·78
Cresswell	22·38	21·38	—1·00
Sunderland	20·91	24·93	+4·02
Mean	24·85	25·98	+1·13

Shewing an excess of 1·13 on 24·85, the average quantity for eight years, equal to 4½ per cent.†

The number of rainy days—reckoning only those rainy, when more than ·01 of a cubic inch of rain fell in twenty-four hours,‡ was slightly above the average of the eight previous years at Wylam, being 185, instead of 172 days.

These remarks upon the rain-fall, may be appropriately closed by referring to two years' observations of a more comprehensive Rain Gauge, which may be termed the

TYNOMETER.

In the year 1861 a series of figures, Roman numerals about 4 inches high, were cut on the south side of the south pier of Wylam Bridge. They are an ascending series, 1 foot apart; zero is at a point ·7 of a foot lower than I have known the water to fall; and the XVIII. is nearly at the top of the vertical

* I find it convenient to note the melted snow in my Journal with two inverted commas, thus " 1.59;" and sleet with one, thus ' 1·59;' it catches the eye and renders the quantities easy of separation.

† I abstain from using the *combined* Wylam and Denton returns for eighteen years, as I have previously done in these "Transactions," because in framing these tables, I have become convinced, that from its peculiar position—at the head of a narrow dene, running southward at a rapid slope; closed in on the west by trees at a distance of 80 or 90 yards, and to the north by the house itself, at 50 or 60 yards; the Rain Gauge at West Denton received more rain than was due to the district.

‡ It is very desirable that this, which is very *generally* the mode of reckoning wet days, were more *universally* adopted; different observations would then be rendered uniform and comparable with each other.

side of the pier. The line marking the height, is immediately beneath the number, as in the XVIII. above. Wylam Bridge crosses the Tyne about a mile above the tide-reach; and excepting Stanley Burn, which runs in just below it, and the drainage supplying the Whittle Dean Reservoirs, all the waters of the Tyne above the tide-reach flow through it. It is, therefore, a convenient place to mark its fluctuations; and I trust that, by some means or other, the registration may be continued in unbroken series for many years.

I have noted this guage nearly daily during 1862 and 1863, and have introduced the result in the tables. As before remarked, the lowest point to which I have seen the water fall, is ·7 of a foot above zero; the highest I have known, since 1852, was on December 7, 1856, when it reached XVIII.; and on November 25, 1861, when it reached the same point; on both these occasions much harm was done by the flood, and the water was more than 1 foot deep on the rails at Blaydon station.

In the terrace of the parsonage garden at Ovingham, the height of several remarkable floods has been marked; *the* flood of 1771 among the rest.

The Rev. George Bigge informs me that the flood of December 7,1856, as noted by him at the time, was, by careful measurement, 10 feet below the mark for the great flood of 1771. Now the flood of December 7, 1856, was at XVIII. of the Tynometer; therefore, if we might assume the area of the river, at Ovingham and at Wylam to be the same, the flood of 1771 would have been at XXVIII. of the Tynometer.

A flood in 1815 was, as marked at Ovingham, 2 feet higher than those of 1856 and 1861 above named.

As regards the observations of the wind for the district, I fear little can be said, and that little on imperfect grounds. The returns sent in, which are capable of tabulation, are only four in number; these four I have reduced to their mean direction and amount, which shows the former to be S.W. by W.; and the amount to be 93 per cent., or 337 days out of 365. But this amount is on the supposition that the winds noted, all blew with equal force; which of course was not the case. The direc-

Monthly Register of the Rain-fall in inches, with the Number of Days on which Rain fell in 1863.

PLACE.	SOUTHERN DISTRICT.					NEWCASTLE DISTRICT.							NORTH TYNE.				NORTHERN DISTRICT.					EAST COAST DISTRICT.									
	Darlington (Southend).	Durham.		Whorlton.	Mean of Darlington, Durham, and Whorlton.	Bywell.		Wylam.		Stamfordham.	Wallsend.	Mean of Bywell, Wylam, Stamfordham, and Wallsend.	Allenheads.	Park End.	Hesleyside.		Mean of Park End and Hesleyside	Roddam.		Glanton.	Lilburn.	Mean of Roddam, Glanton, and Lilburn.	Howick.	Cresswell.	North Shields.	Sunderland.		Seaham.	Mean at Cresswell, Howick. No.Shields Sunderland, and Seaham.
																									Field House.	Hendon Hill.			
Height { Above Sea. / Above Ground.	140 feet. 4 feet.	341		450		87		96 4 ins.		400 1 ft.			1360	4 in.	420 3 ft.			545 6 in.		531	290 6 ft.					80	120		
	Quantity.	Quan.	W.	Quan.	Quantity.	Quan.	W.	Quan.	W.	Quan.	Quan.	Quantity.	Quan.	W.	Quan.	Quan.	W.	Quantity.	Quan.	W.	Quan.	Quan.	Quantity.	Quan.	Quan.	Quan.	W.	Quan.	Quan.	Quan.	Quantity.
January.....	2·41	2·89	19	4·15	3·15	4·08	24	3·80	23	3·63	3·17	3.67	9·00	30	7·73	7·45	25	7.59	4·68	27	4·45	3·42	4·18	1·56	1·71	2·98	23	2·58	16	2·70	2·82	2·39
February	·57	·42	7	·84	·61	·78	12	·55	9	·96	·39	·67	3·20	25	2·49	2·17	18	2·33	0·67	9	·48	·50	·55	·11	1·84	·41	15	·35	8	·51	0·41	·61
March.....	1·54	1.86	14	1·75	1·72	2·19	14	2·10	14	2·05	1·50	1·96	2·40	23	1·23	1·23	14	1·23	0·65	10	1·60	1·21	1·15	·95	·94	1·48	12	1·13	9	1·41	1.31	1·29
April	·55	·63	13	·74	·64	1·11	16	1·04	16	1·64	1·00	1·20	4·23	22	2·87	3·51	15	3·19	2·29	18	1·27	1·02	1·53	·70	1·14	·70	20	·87	10	·96	0·79	·86
May.....	1·29	1·42	14	1·32	1·34	1·17	15	1·22	14	1·83	1·59	1·45	2·65	23	2·53	3·29	14	2·91	1·95	12	2·05	1·59	1·86	1·18	1·09	1·43	23	1·33	11	1·50	1·58	1·35
June	2·29	4·41	20	3·20	3·30	3·87	19	3·89	17	3·90	4·09	3·95	4·03	24	6·52	4·85	20	5·68	2·38	17	4·08	3·88	3·45	2·03	3·18	4·12	22	3·68	15	4·02	4·59	3·60
July	·65	·99	11	1·05	·90	1·22	9	1·29	9	·89	1·20	1·15	1·38	14	1·11	·69	9	·90	1·12	5	0·43	1·09	·88	·60	·64	·73	10	1·17	5	1·21	1·26	·93
August	2·22	1·94	17	3·37	2·51	2·84	18	2·91	20	3·63	2·53	2·98	4·52	26	2·72	4·17	22	3·45	4·49	20	2·79	3·13	3·47	2·31	1·25	2·69	20	2·99	17	2·91	2·49	2·44
September....	1·61	2·01	13	2·29	1·97	3·39	22	3·14	21	2·83	2·28	2·91	6·33	27	3·55	7·74	26	5·64	2·51	21	4·33	3·19	3·34	2·97	3·88	2·20	25	2·15	15	2·06	1·92	2·53
October	3·03	3·44	24	3·63	3·37	3·46	21	3·96	17	2·94	3·68	3·51	5·84	28	4·12	4·50	22	4·31	2·77	25	3·51	1·93	2.74	2·86	2·95	3·22	24	3·19	19	3·42	3·48	3·18
November	1·95	2·54	15	2·35	2·28	3·08	14	3·14	11	2·98	2·98	3 04	5·33	26	3·62	3·55	16	3·59	1·73	9	3·02	2·62	2·46	1·44	2·11	2·89	15	3·15	12	3·01	2·75	2·56
December	1·15	1·53	10	1·56	1·41	1·30	14	1·35	14	1·32	1·83	1·45	5·10	25	3·22	3·52	17	3·37	1·14	10	2·08	2·28	1·83	1·63	·65	1·89	15	2·34	10	2·22	2·25	1·83
Total 1863....	19·26	24·08	177	26·25	23·20	28·49	198	28·39	185	28·60	26·24	27·94	54·01	293	41·71	46·67	218	44·19	26·38	183	30·09	25·86	27·44	18·34	21·38	24·74	224	24·93	147	25·93	26·15	23·57
Total 1862....	..	21·82	207	..	Do. excluding Darlington.	26·49	199	24·68	211	26·00	25·68	..	44·21	291	34·76	..	..	..	..	..	27·12	30·04	..	..	24·77	28·01	260	21·00	196	..	..	Do. excluding Howick.
Total 1861....	..	24·28	191	..		23·80	213	23·54	200	26·22	24·62	..	49·35	282	31·07	..	..	..	..	..	..	26·17	..	..	20·46	24·76	264	24·49	139	..	..	
Total 1860....	..	30·38	..	..	25·16	38·00	259	31·38	219	35·26	34·12	..	59·15	297	31·04	56·	..	..	..	..	..	..	..	..	26·78	32·19	290	24·71	145	..	..	24·63
Total 1859....	..	21·57	..	..	..	27·34	182	25·15	153	27·85	23·51	..	47·71	259	..	..	..	..	..	..	..	25·98	..	..	26·55	..	171	17·19	111	..	..	..
Total 1858....	..	18·73	..	..	..	21·88	165	18·20	127	27·19	..	..	37·21	229	26·00	..	..	..	..	..	..	24·27	..	..	19·43	..	172	17·83	119	..	..	..
Total 1857....	..	21·55	..	..	..	27·55	..	24·47	133	28·86	..	..	41·79	..	25·68	..	..	..	..	..	..	27·11	..	..	20·76	..	..	18·93	..	..	..	..
Total 1856....	..	20·65	..	..	..	29·82	..	29·25	146	35·06	..	..	45·48	..	45·87	..	..	..	..	..	..	32·00	..	..	24·88	..	..	18·12	..	..	..	..
								26·60	172						38·18																
Average of 8 yrs.	..	22·88	..	..	..	27·92	..	31·10	..	29·38	..	..	47·36	...	34·83	..	..	..	..	..	..	..	..	..	22·38	..	..	20·91	..	..	..	..
						Average of 10 years		27 77							31·43																
															36·69																
															27·22																
															31·96																
															30·94																
															31·01																
															24·35																
															33·87																
															Average of 17 years	32·45														

NEWCASTLE AND GATESHEAD WATER WORKS.

RAIN-FALL IN 1862 AND 1863.

Date of Observation. 1862.	Whittle Dean Reservoirs.	Hallington Village.	Fawcett.	Woodford.	Green Crag.	Camp Hill.	Valley of North Tyne.	Monthly Means of the 7 preceding stations.
January ..	1·825	1·700	1·750	1·495	1·850	1·415	1·710	1·677
February ..	1·549	1·735	1·920	1·625	1·715	1·445	1·710	1·671
March	2·724	3·065	3·350	2·925	3·375	2·330	3·220	2·998
April	1·037	1·667	1·705	1·530	1·995	1·525	2·030	1·641
May	2·874	2·715	2·000	1·965	2·510	2·045	1·515	2·232
June	3·224	4·160	4·105	3·895	4·470	3·245	3·165	3·752
July	2·361	1·975	2·120	2·185	2·445	1·995	2·195	2·182
August	3·580	3·810	3·760	3·485	4·315	2·860	3·480	3·612
September..	1·155	1·870	1·705	1·550	2·030	1·530	1·425	1·609
October	1·824	2·360	1·015	1·955	2·405	1·710	3·225	2·070
November ..	·985	·970	·980	·935	·650	·895	1·725	1·020
December ..	1·182	1·595	1·540	1·385	1·705	1·200	1·280	1·412
	24·320	27·622	25·950	24·930	29·465	22·195	26·680	25·876
1863. January ..	3·374	4·605	4·470	4·220	4·975	3·415	4·035	4·156
February ..	·724	1·645	1·485	1·215	1·840	1·290	2·445	1·520
March	2·098	2·230	2·050	1·585	1·655	1·210	1·930	1·822
April	1·100	2·055	2·020	1·660	2 090	2·025	2·625	1·939
May	1·618	2·125	2·105	1·930	2·210	2·295	1·215	1·928
June	3·399	3.730	3·640	3·770	3·810	3·815	3·960	3·732
July	1·255	1·510	1·430	1·570	1·435	1·585	1·255	1·434
August	1·840	2·080	2·010	1·995	2·245	2·125	2·375	2·094
September ..	3·818	3·120	3·180	2·780	2·925	2·830	3·260	3·130
October	3·386	4·435	4·315	4·390	4 845	4·050	5·950	4·481
November ..	3·055	2·400	2·470	2·300	2·150	2·425	2·235	2·433
December ..	1·424	2·730	2·385	2·835	2·135	2·975	3·030	2·502
	27·091	32·665	31·560	30·250	32·315	30·040	34·315	31·171

TEMPERATURE.								Mean Monthly height of Tyne at Wylam.	
1863.	Durham.	Seaham.			Wylam.			1862	1863
	Mean	Min.	Max.	Mean	Min.	Max.	Mean	Feet.	Feet.
January	38·9	34·17	41'14	37·65	38·40	44·52	41·46	2·50	5·00
February	42·1	34·15	45·23	39·69	35·73	48·88	42·30	2·17	3·23
March	46·6	36·50	51·00	43·52	37·20	52·87	45·03	2·93	2·22
April	49·2	38·10	56·25	47.17	38·97	57·40	48·18	2·71	2·45
May	52·1	40 14	60·18	50·16	41·94	58·97	50·45	2·44	2·65
June	56·3	45·25	64·00	54·62	47·89	65·19	56·54	3·23	2·94
July	56·0	48·13	70·20	39·07	46·39	69·04	57·72	2·50	1·27
August	57·0	48·24	68·00	58·12	48·58	67·60	58·09	2·45	1·09
September	52·5	42 30	57·25	49·64	45·40	59·80	52·60	1·48	3·39
October	48·4	41·60	50·27	45·66	40·87	55·90	48·38	4·37	3·29
November	..	34 12	43·24	38·68	38·20	50·67	44·43	2·21	4·39
December	..	35·70	44·28	39·67	35·60	48·58	42·09	3·30	3·00
Mean*	..	39·71	54·24	46·97	41·26	56·62	48·94	2·69	2·91

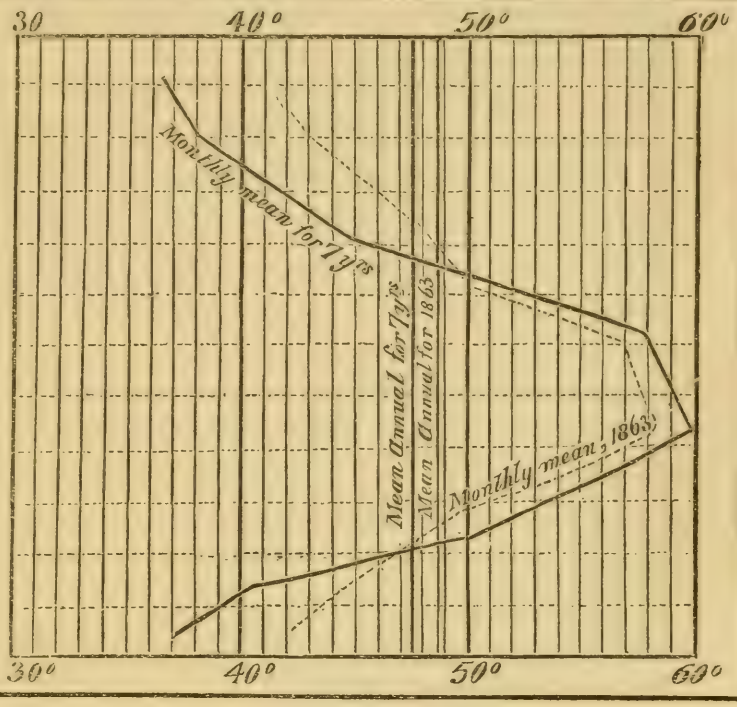
DIRECTION AND AMOUNT OF WIND IN 1863.

1863.	Wylam.		Seaham.	Howick.	Durham.	Mean of Wylam, Seaham, Howick, and Durham.
Jan ...	W, 14° S.	63p.c.	W.	SW & NW.	SW & WSW.	SW x W 96 pc
Feb ...	W, 19° S.	66 ,,	SW & W.	SW & NW.	SSW.	
March.	W, 7° S.	19 ,,	SSW.	SE & NW.	W.	
April ..	W, 9° S.	88 ,,	WSW.	SW & SE.	SW & SSW.	
May ...	W, 8° S.	67 ,,	W & NE.	SW & NE.	SW.	
June ..	S, 10° E.	67 ,,	WSW.	SW & SE.	SW.	
July ..	W, 23° N.	68 ,,	W & NE.	SW & W.	WNW.	
Aug...	W, 10° N.	77 ,,	E & SW.	SW & SE.	SW.	
Sept...	W, 13° S.	89 ,,	W.	SE & SW.	SW.	
Oct	* * *	* * *	SSW.	SE & SW.	S.	
Nov ...	W, 23° S.	73 ,,	SW.	SW & NE.	SW & SSW.	
Dec ...	W, 3° S.	96 ,,	W.	SW & NW.	SW.	
Mean.	W, 11° S.	80 ,,	WSW=56p c	SW,10°S 78 p c	SW,4° N,93 pc.	

* Mean is $\frac{\text{Max} + \text{Min}}{2}$

Comparison of Monthly Mean Temperature of 1863, *with Monthly Mean of the seven years previous, at Wylam.*

Date.	Mean of 7 years.	Mean of 1863.
Jan...	36·82	41·86
Feb...	38·09	42·30
Mar..	41·48	45·03
Ap...	41·40	48·18
May..	51·38	50·45
June.	57·70	56·51
July..	58·98	57·72
Aug..	59·90	58·09
Sept..	54·11	52·60
Oct..	48·99	48·38
Nov..	40·86	44·43
Dec...	37·90	42·08
Ann. Mean.	47·55	48·97



Comparison of Winter and Summer Months.

	Seven Years.	1863.
November	40·86	44·43
December	37·90	42·08
January	36·82	41·86
February	38·09	42·30
March	41·48	45·03
April	44·40	48·18
Mean	39·93	43·98
May	51·38	50·45
June	57·70	56·54
July	58·98	57·72
August	59·90	58·09
September	54·11	52·60
October	48·99	48·38
Mean	55·18	53·96

Six Winter Months.

Temperature of Six Winter Months in 1863	43.98
Temperature of the same months of the Seven preceding years	39·93
1863 above Mean Temperature..	4·05

Six Summer Months.

Temperature of Six Summer Months in 1863	53·96
Temperature of the same months of the Seven preceding years	55·18
1863 below Mean Temperature ..	1·22

tion, also, is probably only vaguely ascertained. My means of observing it at Wylam, for instance, being generally from the highest clouds overhead, which would often be very different in direction from the local wind of the country.

I have framed the table, however, to shew in what manner good reliable returns might be worked up; and where the two elements of direction and force are properly recorded; how valuable the deductions might be. Conceive a map of England with the mean annual direction and amount of wind, marked on it in arrows, for a great number of places; what instructive general inferences would be suggested!

Such observations ought to be made on open elevated ground, like the top of the Town Moor, Kenton, Newbiggen House, &c.; and if members living in such situations would record daily, it might be worth while for the club to erect Robinson's anemometers for their use, even if members could not be found to establish them for their own gratification. But the situations should be well chosen, or the records would be worse than useless, as tending to mislead.

We come now to records of temperature, of which I am sorry that there are only two complete returns; that from Durham being imperfect, as well as a very elaborate one from Mr. E. Pease's gardens, near Darlington.

This is much to be regretted, as all other Meteorological Phenomena have their origin in heat. Change of temperature produces winds; winds bring rains and clouds; these again re-act upon the temperature by intercepting the sun's rays and the earth's radiation; while the moisture raised by evaporation, being lighter than the air itself, as 6 to 10, causes powerful updraughts whenever it occurs; and is probably one of the most influential agents put in operation by temperature. There is, therefore, no Meteorological fact, which it is so important to ascertain and record, as this; and it is one to which the society might, I think, most usefully direct its attention. A set of good instruments (I would go no further than a maximum and minimum and a wet and dry thermometer) are not expensive; and many of our friends would doubtless possess themselves of them, and be

willing to give, at any rate, a *daily* record; but placing thermometers so as to give true indications, is a nice point; and it is here that I think, as a society, we might be useful, by appointing a committee to aid in placing instruments; and in ascertaining generally the reliability of observations.

As a rule, after obtaining accurate thermometers, they should be suspended with a full north exposure, about 4 feet from the ground, in a double-sided wooden box, which should perfectly screen them from the sun and open sky, and be in a situation entirely beyond the influences of artificial warmth or reflected heat.

The heat in 1863, though a plentiful harvest shewed its benign influence, was singularly distributed. The temperature or the whole year (48·97°), at Wylam, was 1·42° above the mean temperature of the preceeding seven years (47·55°); but this excess was entirely in the six winter months, from November till April, both included; when, as will be seen by the table accompanying the diagram, these six months of 1863 were 4·05° above the mean of the same months in the seven years preceding; while for the six summer months, the temperature of 1863 was 1·22° below the same mean.*

A reference to the diagram (p. 247) will explain this in a very clear manner.

The highest and lowest temperatures were as follows:—

	Date of Highest.		Date of Lowest.	
At Durham,	July 10, 84·3	;	March 12,	21·4.
At Seaham,	June 26, 78·0	;	March 12,	22·0.
At Field House,	July 14, 81·5	;	December 22,	22·0.
At Wylam,	July 11, 82·0	;	February 16, March 12, December 28,	23·0.

From the high temperature of the first months of the year, the spring was a very early one.

	In flower, 1863.	Meantime of of flowering in 7 years.	Difference.
At Wylam, apricot on cold wall	...Feb. 25	Mar. 25	8 days.
„ Ribes sanguinea	.....Feb. 25	Mar. 20	23 „
„ Pear on cold wall	..... Mar. 20	Apr. 1	11 „

* All my mean temperatures are $\frac{\text{Max.} + \text{Min.}}{2}$, which for single monthly record is not strictly correct; but for annual mean temperature, will I think be found nearly so.

showing the spring of 1863 to be earlier than usual by about 14 days; but the summer was dull and ungenial.

I had hoped to include in this paper a reference of the height of the flood of 1771, at various places in the vale of the Tyne, to the levels laid down by the Ordnance Survey, but have not been able to do so. Indeed the paper has grown to such a length, that I must bring it to a close, in the hope that I may at some future time be able to contribute some information on this point.

Postscript.—Since our report and the accompanying tables were in type, we have been favoured by Mr. D. D. Main with a tabular statement of the amount of rainfall in 1862 and 1863 at seven different stations of the Whittle Dene Water Company. This interesting report we insert separately in the form of an appendix (p. 245); to include it in the general table would involve the reconstruction of the whole.

XXIII.—*Tables relative to the Flowering of Plants, &c.*, 1863.

Edited by George S. Brady.

The tables printed in this report require very little editorial remark. The value of such observations can scarcely be appreciated except by the comparison of a considerable number of consecutive years, materials for which are yet wanting. A comparison of the dates given opposite to the several localities at which observations have been recorded during the past year does not furnish us with any trustworthy generalizations as to the relative forwardness of the different parts of the two counties, though it would rather point to the conclusion that, during the first two months of the year, vegetation was more advanced near the sea-side than in inland localities. This, however, considering the scanty data on which we have to depend, cannot be asserted with any degree of certainty. Another source of fallacy should also be borne in mind, namely, that different observers would very probably, under precisely the same circumstances, record different dates, one, for instance, considering a tree to be in bud when the first appearance of a bud was visible, another only when the bud was fully developed.

On this account it is desirable to have records year after year by the same observer, and as far as possible from the same individual plants. The tables contributed by Mr. Coppin are in this respect especially valuable, and it is to be desired that other members of the Club would follow his example in thus filling up for several consecutive years the forms issued by the Club, which may always be had on application to the Secretaries. On the whole it appears that vegetation was, in 1863, from a fortnight to three weeks in advance of the preceding year.

(1) *Table showing Dates of Budding, &c., of Forest Trees.*

	RODDAM.			SEAHAM.			DARLINGTON.		
	In Bud.	In Leaf.	Divested of leaves	In Bud.	In Leaf.	Divested of leaves	In Bud.	In Leaf.	Divested of leaves
Alder	..	Apr. 28	..	Apr. 1	Apr. 28	..	Apr. 17	Apr. 29	Nov. 10
Ash	..	May 20	Nov. 2	Apr. 1	May 12	Nov.	May 12	May 26	Nov. 12
Beech	Apr. 10	May 14	Nov. 1	Apr. 20	Apr. 27	Nov. 12	Apr. 19	May 1	Oct. 16
Birch.....	..	May 19	Nov. 6	Apr. 2	Apr. 30	..	Mar. 28	Apr. 25	Oct. 20
Elm	..	May 19	Nov. 10	Apr. 1	Apr. 26	Oct. 12	Mar. 22	May 1	Oct. 9
Larch	..	Apr. 26	Nov. 20	Mar. 4	Apr. 1	Oct. 10	Mar. 24	Apr. 6	Oct. 20
Oak	Apr. 20	May 18	Nov. 30	Apr. 5	May 5	Nov.	Apr. 23	Apr. 30	Nov. 16
Poplar	Mar. 19	May 2	..	Mar. 1	Apr. 2	Oct.	Feb. 12	Mar. 26	Oct. 26
Sycamore..	Mar. 1	Apr. 28	Nov. 20	Mar. 2	Apr. 20	Oct. 12	Mar. 12	Mar. 28	Nov. 1

(2) *Table showing dates of Flowering of Trees and Plants.*

	Roddam.	Stamford-ham.	N. Shields	Seaham.	Darling-ton.	Winston
Apple	May 11	May 15	April 25	April 20	April 23	April 26
Cherry	,, 2	..	,, 6	,, 24	,, 12	,, 18
Pear	,, 4	May 10	,, 6	,, 10	Mar. 26	,, 30
Plum	..	,, 10	..	,, 9	April 1	..
Black Thorn	..	..	..	March 12	April 21	April 6
Bramble	..	..	May 27	June 16	June 15	..
Broom	April 10	May 2	..	..	May 10	May 20
Currant, Black	,, 5	..	April 14	..	Mar. 26	April 12
,, Red Flowerg.	March 22	..	Feb. 11	Feb. 28	,, 2	Mar. 12
Elder.....	April 28	..	June 14	June 6	June 12	June 23
Gooseberry	March 25	..	March 24	March 21	Mar. 24	Mar. 22
Hawthorn	May 21	..	May 9	May 10	May 10	May 24
Hazel	,, 14	..	..	Jan. 30	Feb. 1	Mar. 15
Honeysuckle	June 6	..	..	May 3	June 28	June 12
Laburnum	May 2	..	May 8	,, 12	May 13	May 21
Lilac.....	April 18	May 20	April 27	April 27	,, 1	,, 9
Mountain Ash	,, 30	..	May 13	May 20	,, 12	,, 6
Privet	May 30	..	..	..	June 28	..
Rose	..	..	..	April 27	,, 1	June 7
Sallow	April 30	..	..	Feb. 2	..	..
Whin or Furze	Feb. 1	..	..	Jan. 12	Feb. 14	Feb. 8
Anemone.....	April 15	..	..	March 12	Mar. 20	Mar. 28
Blue Bell.....	May 13	..	..	April 18	April 27	April 20
Coltsfoot	March 7	Feb. 21	Feb. 12	Feb. 9	Mar. 18	,, 19
Dandelion	May 1	March 1	,, 26	,, 9	,, 8	Mar. 19
Garlic	,, 30	May 12	..	May 12	..	April 16
Lily of the Valley	,, 12	,, 8	May 3	,, 9	April 29	May 10
Primrose.....	Feb. 21	April 12	March 21	..	Jan. 9	Feb. 22
Strawberry, Garden ..	June 1	May 24	April 23	April 23	April 6	April 24
,, Wood ..	..	,, 24	..	May 8	,, 14	May 2
Snowdrop	Jan. 28	Feb. 17	Jan. 27	Jan. 30	Jan. 23	Jan. 25

(3) *List of Wild Plants growing within three miles of Tynemouth, with the Dates of Flowering, &c., during the season* 1863.

By JOHN COPPIN, M.A.

Tussilago farfara	Feb. 12	Viola canina	Mar. 28
Ranunculus ficaria	Feb. 7	Ribes grossularia	Mar. 23
Lamium album	Jan. 31	Prunus spinosus	No blossom
Lamium purpureum	Feb. 12	Cratægus oxyacanthus	May 9
Glechoma hederacea	Mar. 20	Trifolium pratense	May 2
Veronica hederifolia	Mar. 4	Ranunculus arvensis	Apr. 5
Veronica chamœdrys	Apr. 25	Potentilla anserina	May 5
Primula vulgaris	Mar. 21	Rosa canina	..
Primula veris	Apr. 11	Bramble	May 27

(4) *List of Dates on which the following Fruit Trees, Shrubs, and Plants first flowered in a Garden in North Shields in* 1863.

By JOHN COPPIN, M.A.

Gooseberry	Mar. 24	Yellow Auricula	Mar. 24
Red Currant	Mar. 23	Purple Auricula	Mar. 13
Pear Tree (Jargonelle)	No blossom	Blue Hyacinth	Apr. 20
Apple Tree (Keswick Codling)	Apr. 12	Lily of the Valley	May 10
Cherry Tree	Apr, 4	Purple Lilac	Apr. 27
Yellow Crocus	Feb. 25	Laburnum	May 8
Purple Crocus	Feb. 26	Chrysanthemum	Nov. 6
White Crocus	Feb. 27	London Pride	Apr. 27

(5) *Table of dates of Arrival and Departure of Birds.*

	STAMFORDHAM.		SEAHAM.		DARLINGTON.	
	Arrival	Depart.	Arrival.	Depart.	Arrival.	Depart.
Chiff Chaff	May 14	..	April 23	August.	..	..
Corncrake	May 8	..	May 6	July.	April 29	July 26
Cuckoo	May 1	..	May 5	Sept. 1	May 9	..
Fieldfare	..	..	Nov. 2	..	Nov. 24	Feb. 24
Redstart	May 8	..	..	Oct. 13	April 27	..
Starling	..	..	Seen throughout winter.		Jan. 9	Nov. 12
Swift	..	..	May 13	Sept. 3 to Oct. 15	April 11	Aug. 12
Swallow	Ap. 11 to May 1	..	May 1	Sept. 17	April 11	Oct. 12
Whitethroat	April 19	..	May 10	Sept. 10	..	..
Willow Wren	..	..	April 18	Sept. 10	..	..
Woodcock	..	..	Oct. 10	Mar. 10	Oct. 9	..
Flycatcher	June 17	..	May 17	July 30	..	..
Sedge Warbler	..	..	April 24	July 30	..	..
Martin	..	..	May 17	Sept. 1	..	..

The Ash came into leaf about four days sooner than any year for the last eight years. The same tree usually unfolds its leaves about the 12th of May.— *Mr. Draper, Seaham Hall Gardens.*

Our observations of insects are very meagre. The White Butterfly is noted as seen at Seaham on April 16th; Stamfordham, March 18th; Roddam, March 26th; and Darlington,

March 30th. The Orange Tip, at Stamfordham, June 1st; Darlington, April 1st. The Tortoiseshell, at Seaham, July 12th; Darlington, July 6th. The Cockchafer, at Seaham, April 29th; Darlington, April 20th. Humble Bees, March 3rd, at Darlington; March 31st, at Seaham and Roddam; March 5th, at Stamfordham. At Darlington, Wasps are said to have been "very numerous and destructive, February 12th;" and the Rev. J. F. Bigge says, "April 12th, a very great number of queens; I killed forty-five in my garden." The Rev. W. T. Shields, of Warden Vicarage, writes, "on the 5th of December I killed a large wasp in my dressing room; he was buzzing in a lively manner against the window. The house-fly has been a more prolonged nuisance than usual."

For the observations contained in these tables, and in the preceding Meteorological Report, the Club is indebted to the following contributors:—

Allenheads.....Mr. Thos. J. Bewick, Lead Mines, Allenheads.
Bywell .....Do. Do. Do.
Darlington.....Edward Pease, Esq., Southend.
Durham.....Mr. E. G. Marshall, Observatory.
Howick Hall, the seat of Earl Grey .....
Lilburn Tower, the seat of E. Collingwood, Esq. } Communicated by the Rev. J. F. Bigge.
Roddam Hall, the seat of Wm. Roddam, Esq. ...
North Shields ..... { Mr. Robert Spence. Mr. J. Coppin.
North Tyne . ..... { William Henry Charlton, Esq., Hesleyside. Matthew Ridley, Esq., Park End.
Seaham Harbour .....Mr. Draper, Seaham Hall Gardens.
Stamfordham .....Rev. J. F. Bigge.
Sunderland ..... { Mr. J W. Mounsey, Hendon Hill. Rev. George Iliff, Field House.
Wallsend ....Mr. J. W. Dees.
Whittle Dene Water Co., Mr. D. D. Main.
Whorlton, Teesdale.....T. Dodgson, Esq., Stubb House.
Wylam .....G. C. Atkinson, Esq., Wylam Hall.

XXIV.—*Miscellaneous Notices and Observations.*

Occurrence of Hypericum lineolatum, Jordan.—The Journal of Botany for this month contains a paper by Mr. J. G. Baker, on *Hypericum lineolatum*, Jordan, which seems a well known plant in France and Belgium. Mr. Baker refers to this species a plant which grows sparingly in the neighbourhood of Thirsk, and which differs from *H. perforatum* in having conspicuous black lines in the furrows of the outer surface of the petals, and in having some of the lower leaves dotted very sparingly with pellucid points. In July, 1857, I gathered a *Hypericum* on the roadside between Hexham and Wall, which I supposed to be a form of *H. perforatum*, with patent, instead of spreading branches in the panicle. It is evidently *H. lineolatum*, and Mr. Baker identifies it with the Thirsk plant. Among plants gathered in the same year I may mention *Spergularia marina*, Camb., on the coast at Warren Mills, near Bamborough, and in saltmarshes on the Tees, and *Arenaria leptocleados* (Guss. Fl. Sic.) on the coast at Tynemouth.—*William Henry Brown, North Shields, September*, 1863.

Curious growth of a Potato.—I found lately a very remarkable instance of the curious effect produced on vegetable life by the total absence of light, in the underground workings of Pelton Colliery. It consisted of a potato which had been covered over by a very thin layer of coal dust (not above a quarter of an inch), in a portion of the mine formerly in operation, but now closed off, and but seldom visited. The tuber had thrown out vertically and *upwards* some whitish stems, about four or five inches long, upon which (instead of on the fibres of the roots) were a quantity of well-formed but small potatoes varying in size from a pea to a good-sized marble. The colour was a dingy white, but they seemed in no other respect different from ordinary potatoes. No trace of root or leaves could be seen, and it remains a question how far, by the total absence of light (for even lamps would only pass rarely by the spot), the processes of nature were reversed; and whether the roots growing upwards replaced the usual stems and leaves. I believe a

somewhat similar example, grown in a dark cellar, is figured in Lindley's Botany.—*D. P. Morrison, Pelton Colliery, November*, 1863.

New localities for rare Coleoptera.—During the past year (1863) new localities have been found for rare, or local Coleopterous Insects, which may be worth recording in our Transactions. *Amara convexiuscula* has occurred, near South Shields, in some plenty. *Gyrinus minutus* was found, by the Rev. R. Kirwood, in "Hell Kettles." *Phytosus spinifer*, and *Phy. nigriventris*, occurred, the first rather plentifully, near Hartley. Both species harbour under tufts of the Sea Rocket (*Cakile maritima*) growing on the sand, in the vicinity of heaps of Algæ. *Homalota vestita*, *gregaria*, and *longicornis* have likewise been found at Hartley, Whitley, and South Shields. The last locality also produced *Myllæna brevicornis*. *Quedius fumatus* occurred at Gosforth, early in spring, frequenting fallen leaves. *Philonthus umbratilis* hitherto very rare, has occurred at Gosforth and on the coast, and I found it to frequent debris in Cumberland. *Philonthus temporalis*, and *punctiventris* have again occurred at Long Benton, but very sparingly. *Philonthus longicornis* turns out to be abundant all over the district. *Xantholinus ochraceus* has also been found rather common, and mostly on the sea coast, where *Othius læviusculus*, and *Lithochavis melanocephalis* have also been taken. Near Hartley, also, I found the very rare *Stenus atratulus*. Another species, also rare with us, *S. unicolor*, was found to frequent the burrows of *Bledius arenarius*, near Whitley. *Coprophilus striatulus* was found in March, beneath stones, near South Shields. *Olophrum piceum* was found to frequent dead leaves, in woods, at Gosforth, in March. *Phlæobium clypeatum* has been taken at Little Benton, and near Hartley. *Læmophlæus ferrugineus* was found among the stones of the ballast heap, near South Shields. *Cryptophagus acutangulus* has been taken plentifully in Durham, by the Rev. R. Kirwood. *C. badius* occurred at Long Benton, and Cullercoats. The very rare *C. bicolor* was taken at Long Benton, in March and April. *Atomaria umbrina* and *nigriventris*, both rare local species, are from Long Benton, Gosforth,

and South Shields. *Ischnornera melanura* occurred at South Shields, in a piece of timber, where it had apparently bred in some numbers, as the wood was completely riddled by their burrows. *Orthochætes setiger* was found in the sand hollows, on the coast, between Whitley and Hartley. *Thyamis atricilla*, *lævis*, and *ochroleuca*, are from nearly the same locality, frequenting the plants growing on the sea-banks. And, finally, I found *Lathridius nodifer* feeding on fungi at Little Benton, late in autumn.—*Thomas John Bold, Long Benton, Feb.* 11, 1864.

ADDRESS TO THE MEMBERS OF THE TYNESIDE NATURALISTS' FIELD CLUB,

READ BY THE PRESIDENT, EDWARD CHARLTON, ESQ., M.D., AT THE EIGHTEENTH ANNIVERSARY MEETING, HELD ON THURSDAY, THE 10TH OF MARCH, 1864.

Gentlemen.—The office of President of the Tyneside Naturalists' Field Club, has generally been conferred upon naturalists in the counties of Northumberland and Durham, or else on those who have devoted themselves to Antiquarian pursuits in the same locality. It is probable that we owe the distinguished honour of holding this position to the fact of our entertaining a great affection for both of these sciences, though we must confess that Natural History has, for by much the longer period, engaged our attention. We were collectors of birds and observers of their habits as far back as 1824, and in 1830 there commenced that acquaintance with the late Edward Forbes which ripened into a warm friendship that continued unabated till his early and deeply regretted death. Of late years, as a relaxation from the severe duties of our profession, we have devoted much of our spare time to Antiquarian research, but the old love for natural science still continues, and from time to time receives fresh stimulus from contact with so many earnest naturalists at the meetings of the Field Club. As a member of the Club from its commencement, we have seen with joy its gradual

increase, not only as regards members, of whom it now numbers between five and six hundred, but also as to the great esteem with which its published Transactions are regarded by the learned world.

A few years ago, the wide excursions now planned and executed by the Club would have been simply impossible. Our excursions from Edinburgh, under that hardy pioneer of science, the late Professor Jameson, seldom extended beyond walking distance, whereas now it is not uncommon for the members of the Club to breakfast some forty or fifty miles from Newcastle, to spend the day in exploring mountain ranges that cannot even be seen from the vicinity of our town, and yet to reach home comfortably at night-fall. Every year fresh lines of railway are being opened in this district, and thereby fresh facilities for visiting distant localities are afforded to the Club. The Barnard Castle line from Auckland has opened to us the rich valley of the upper Tees; the new Waverley Route allowed us this year to rendezvous at Kielder; the Lanchester Valley line has given access to the Browney district, and Redesdale and Wallington will soon be visited by the Club as the railway thither is to be completed this year. The Naturalists of the Scottish capital and of the great coal metropolis of the north, may be said to have shaken hands on the Border, for only a week previous to our visit to Kielder, some eighty Edinburgh students, the botanical class of Professor Balfour, spent a day in botanizing at the head of the North Tyne, and returned to Edinburgh at night.

The field meetings of the Club during the past year have been exceedingly well attended.

The preliminary social gathering of the season, the meeting in May, was held at Ryhope, and was terminated by a dinner of about twenty-five of the members at Seaham Harbour. The weather was dry, but exceedingly cold, and the piercing north wind had so raised the sea, that very little could be done in the way of geology; or among the rocks within high water mark.

The June meeting was appointed for Lanchester, on the new Lanchester Valley line. About sixty members left Durham and proceeded by train up the valley of the Browney to Witton

Gilbert, passing on the way the elegant gable of the ruins of Beaurepaire or Bear Park, a former country seat of the ecclesiastics of Durham. By the kind consideration of the President of St. Cuthbert's College, at Ushaw, the Club had been invited to visit that large establishment, where many of the buildings designed by the Pugins and others, are well worthy of inspection. About forty of the members here left the train to visit the college, while the others, under the able guidance of the Rev. William Greenwell, proceeded to examine the woods about Lanchester and Greencroft. At Ushaw College, the party was most kindly received by the President, Dr. Tate, and the staff of professors, and after partaking of refreshment in the dining room of the masters, proceeded to examine the whole of the establishment. The college was opened in 1807, by some of the clergy from the parent establishment at Douay, in France, who, during the French Revolution, had established themselves at Crook Hall, near Consett, till the building at Ushaw was completed. It consisted originally of a plain quadrangle, without the slightest architectural decoration. About fifteen years ago the new church was erected from the designs of the late A. W. Pugin, and soon after, the refectory was enlarged and decorated, and a handsome lecture-hall was formed out of the old chapel by Mr. Joseph Hansom. The new library which contains already about 26,000 volumes, was also built by Mr. Hansom. It was the gift of the late Rev. J. Wilkinson, of Kendal, one of the last surviving professors of the College of Douay before the Revolution. The same venerable gentleman, who died a few years ago at the great age of ninety, also presented to the library a choice selection of about 16,000 volumes of books. Five thousand volumes of very valuable mathematical and philosophical works have recently been added. There are a few very curious early MSS. and the collection is rich in early controversial works, both Catholic and Protestant. Ten years ago a new Infirmary, quite apart from the house, was erected by the younger Pugin, under whose superintendence was also built the new seminary, with church, &c., for one hundred younger boys. The great corridor between the two establishments is now being

fitted up as a Natural History Museum. The farm buildings, about half a mile from the college, are on a very large scale, and are fitted up with the most recent improvements. Leaving the college, the party traversed the crown of the hill towards Esh, and then descended towards the village of Lanchester, by a road and through farms in such a condition as is now rarely to be seen except in West Durham! After visiting the church, which was restored a few years ago, and has therefore lost most of its interesting features, the united party sat down to an excellent dinner at the inn. After dinner, some new members were elected, and several parties went off to visit the Roman station on the hill immediately above. It is a large and very perfect station, and several valuable antiquities and inscriptions have been discovered here. The remains of buildings can be observed in many places above the level of the soil, but although the present excellent proprietor, Matthew Kearney, Esq., of the Ford, takes every care to preserve the station, the pasturage within its precincts is too valuable to allow of antiquarian research therein. At half-past seven the party returned to Newcastle, after a most agreeable day, favoured by fine weather.

The excursion for July was boldly fixed on St. Swithin's day, July 15, and the heights around Kielder, at the head of the North Tyne, were selected for the gathering.

The day was fortunately magnificent, and the moors perfectly dry. From Bellingham, which had been visited two years before by the Club, the whole of the ground was quite new. The train swept along the north bank of the Tyne, passing the hamlet of Charlton, and directly after, through some moorland, the first piece of absolutely uncultivated ground that had yet been traversed. Almost all the way, however, up to Kielder, the line keeps within the pasture grounds or haughs by the side of the river. At Tarsett it cuts through the mound on which that ancient stronghold, the seat of the Comyns of Badenoch, once stood. Hardly a stone of the original building is left; the castle has probably remained in ruins ever since 1523, or thereabouts, when, according to the papers preserved in the Record Office, it was "bruntte by ye Tyndaill men at a tyme when Sir

Rauff Fenwyke lay there with a certeyne garrison." Above Tarsett the moorlands come pretty close to the river bank, but all along there is a strip, often very narrow, of rich haugh land that separates the "fell ground" from the stream. Falstone, the next station, is a plain, modern looking village, considering its high antiquity. The Peel House or tower of the Lairds of Falstone, who of course were Robsons, is still standing, and bears the date of 1610; and the inn, which is being rapidly modernized, more resembles the old Scottish change-house than the modern Border hostelrie. Falstone is famous among antiquaries as having afforded the important Anglo-Saxon inscription deciphered a few years ago by the Rev. Daniel Haigh, and now preserved in the museum at the old Castle. It is twice written on the stone (evidently a fragment of a cross), first in Romanesque characters, and then in Runes, and runs as follows:—

† EOMŒR THOE SŒTTŒ	Eomer set that after
AEFTER HROETBERTITÆ	Hroetberht. A memorial
BECUN ÆFTER EOMŒ	after his Uncle.
GEBIDÆD DER SAULE.	Pray for his soul.

After a brief stop at the Plashetts station the train passed on to Kielder, where a few of the party got out, but the great majority, nearly fifty in all, proceeded to Saughtree, on the very line of the Border, where they alighted. Under the guidance of Mr. F. Charlton, the President's brother, the party turned to the left, leaping across the Tyne, which here forms a mere muddy ditch, and then proceeded to inspect the once celebrated Dead Water Well, a sulphurous spring of considerable strength. Forty or fifty years ago this spring enjoyed a high reputation. A bath was built there, and peats duly placed near the house, which, however, was uninhabited. The individual who wished to take the bath first filled the boiler with water from the well, then heated this to a proper temperature, and closing the door, enjoyed a quiet and certainly a solitary bath. Unfortunately this primitive apparatus has been recently destroyed. From hence the party, re-crossing the railroad, ascended Pearl Fell, a steep hill rising nearly 2,000 feet above the sea; whence, on a clear day, the view is very

remarkable. This day the view to the south-west was unfortunately obscure, the Solway and the shores of that inlet could not be seen, but to the south-east and north-west the atmosphere was clear. As the long-drawn line of pedestrians neared the summit, the eyes of the Botanists were delighted by large quantities of the *Rubus chamæmorus*, or cloud-berry, in full fruit. This fine Alpine plant is rarely found below the altitude of 1,800 feet, but it is spread all along the higher summits of the Border hills. After a long gaze over the bright landscape, the party descended to the Kielder woods, fine natural copses, remnants of the old Border forests which it was recommended in Queen Elizabeth's time should be cut down or burned, "so that the misdemeaned people might not harbour therein." We are informed that some years ago the remains of a burnt forest were discovered near the Lewis-burn, in a peat moss. The trees all bore marks of having been submitted to the action of fire. The line of railway now traverses the route taken by the Liddesdale borderers in their forays against the Fenwicks of Wallington. In one of the Cotton MSS. Sir Robt. Musgrove reports, "When Liddisdaill people make any invacions to the Fenwickes they goe without Bewcastell 10 or 12 miles, and goe by the Perl Fell withoute the Houe-head near Keldar, and soe along above Cheapchase."

The great stronghold of the border thieves was at the head of the Lishap burn, a feeder of the Lewis burn. Sir William Eure writing from Hexham to Cardinal Wolsey, on the 26th of July, 1536, says, "The rebelles of Tyndale make some besyness in Tyndale, where their dwellings was, and in noe place else they mele or does hurt; their abydings is in a place called Lushburn Nowles, a marvellous strong place of woodds and waters." At Kielder the party rested for a long time, enjoying the fine view from the front of the castle. The building itself is well-known to be utterly unworthy of its position, but it was erected at a period, about a hundred years ago, when architecture was at its lowest ebb. Leaving Kielder, the party set off for a four mile walk at a sharp pace across the dry and springy moors, to the Plashetts Colliery. On their way they passed through the

ancient limits of Kennell Park, an old hunting enclosure of the earlier feudal barons, and perhaps even of the line of the Comyns of Badenoch. The limits of the park can in most parts be pretty distinctly traced, and there is yet an old tradition current here, that the ruined East Wall of Kennell Park was the last spot that harboured a wild red deer in this district. It had been intended by some of the party to examine a remarkable deposit of porcelain earth near to the Belling Cross, but time did not allow of this, and we can only exhibit a specimen. About thirty years ago the late Mr. William Hutton had some pottery made from this earth, but we do not think that the specimens were favourably received. The old cross at Belling is called Hawkhope Cross in Armstrong's map of 1796. It is now overthrown and lying in the heather, but its destruction is of recent date, for a greedy shepherd upset the ancient stone in the hopes of finding a treasure buried beneath it. Shortly after one of his own sheep was found drowned in the excavation he had made. We strongly recommend this incident to the editors of the next edition of Sir Henry Spelman's Judgments. Not far hence, too, is the ancient hamlet or house of Wenhope, which is mentioned in 1279, as the abode of one "Emma," who having been detected stealing in Bellingham, one market day, was then and there laid down by the townspeople, and her head chopped off, and no coroner's inquest called, according to the prediliction of the judges of king Alexander the Third of Scotland, sitting at the Mote hill at Wark, in November of that year.

A branch railway now leads up to the busy colliery village on the Bellingburn in a most wild mountain district. Here a plain but plentiful repast was provided by the owners of the colliery, and every attention was shewn in explaining the position of the coal-field, &c. Before leaving the subject of the Kielder excursion we gladly avail ourselves of the opportunity of examining certain statements made by one of the most pleasing, if not the most accurate writers of the our day. In vol. I., p. 285, of his History of England, the late Baron Macaulay wrote the following passage:—"Within the memory of persons who are still living the sportsman who wandered in pursuit of game to the

sources of the Tyne, found the heaths round Kielder Castle peopled by a race scarcely less savage than the Indians of California; and heard with surprise the half naked women chanting a wild measure, while the men with brandished dirks danced a war dance."

It was natural that so remarkable an assertion should arouse the attention of the inhabitants of the Border districts, and we ourselves took no small pains at the time to discover the origin of the story. The reference given by Baron Macaulay for the truth of his assertion is to the Journal of Sir Walter Scott's Visit to Alnwick, in 1827, where he was received by the late Duke of Northumberland. Referring to a conversation with His Grace, Sir Walter says: "He tells me his people in Kielder were all quite wild the first time his father went up to shoot there. The women had no other dress than a bedgown and petticoat. The men were savage, and could hardly be brought to rise from the heath, either through sullenness or fear. They sung a wild tune, the burden of which was *orsina, orsina, orsina.* The females sang, the men danced round, and at a certain point of the tune they drew their dirks, which they always wore."

It is well known that Sir Walter Scott loved to improve any story which gave an air of additional romance to his wild border districts. The old gipsy king of Yetholm declared he did not recognize his own stories when they came back to him from Abbotsford; and we strongly suspect that the late worthy owner of Kielder would not have discovered his own plain tale of his parent's first visit to that place under the cloak of romance thrown over it by the great novelist. Macaulay loved to make a brilliant antithesis, and truth had a bad chance between these two great writers of fiction; but Macaulay's version is the less romantic of the two, only that he unfortunately added that it was "within the memory of persons still living." Now the late Duke of Northumberland was born in 1742, and would probably not go up to Kielder to shoot till he was twenty years of age, or about 1762 to 1770. Few living witnesses of that period would be alive at the time Macaulay wrote. But there was one who had reached a patriarchial age, and who had been a landed

proprietor in that immediate neighbourhood since the year 1786, the very year in which the second Duke of Northumberland succeeded to the title, the late Sir John Swinburne of Capheaton. In a letter addressed to us on the subject, in 1856, Sir John says: "I have been a landed proprietor at the head of North Tyne for seventy years and more (he was then in his 95th year), and my acquaintance with the district commenced some twelve years before that time. I remember old people who inhabited that country before the rising under Lord Derwentwater in 1715, but I never witnessed myself, nor ever heard a word from any person of such customs as Macaulay alludes to. The Borders were as quiet in my earliest youth as they are at the present day."

The Fourth Meeting of the Club was held at Warkworth, in August, and the Durham Architectural Society met the Club on that day.

An Extra Meeting was arranged in conjunction with the committee of the British Association, which this year again visited Newcastle. The locality was excellently chosen for all parties, as it was interesting both to the Naturalist and to the Antiquarian, and accordingly a very large party assembled at Bardon Mill along with many members of the British Association. After a short visit to Mr. Clayton's newly acquired property of Chesterholme, the visitors streamed across the country to the line of the Roman Wall at Hot-bank where the Antiquarian features of the locality were admirably descanted upon by Dr. Bruce. Meanwhile a number of the Naturalists under the guidance of our secretary, Mr. George S. Brady, examined the western and northern shores of Crag Lake. From Hot-bank the party proceeded to Housesteads where an excellent luncheon had been provided, which was rendered still more attractive by a liberal present of champagne from Mr. John Clayton of the Chesters, the well-known owner of Housesteads. This excursion was generally regarded as one of the most successful of those that took place during the meeting of the British Association.

In September the Club spent a pleasant day at Barnard Castle, spending the morning in a walk down to the junction of

the Greta and the Tees, with a visit to the romantic grounds of Rokeby.

The Seventh and Last Meeting of the season was held, as is usual, at Marsden, and was very well attended, in spite of the advanced season of the year.

The Club is now accommodated for its winter meetings in the new rooms belonging to the Natural History Society, and a plan for effecting a partial union between the two societies will be laid before the present meeting.

The evening meetings have been well attended, and many papers of importance have been read and discussed. But something more than mere attendance is required to insure the permanent success of the society. Mere dry catalogues of objects will hardly attract members, but well digested papers on the habits of animals, and especially on the lower forms of animal life inhabiting the seas, are always interesting. The working members of so large a society should not be few. There is no greater mistake than to imagine that a regular course of study is required to become a Naturalist. The taste for the study of Natural History arises imperceptibly, it is fostered by familiarity with natural objects; and the more knowledge we obtain of the operations of nature, the more do we wish to acquaint ourselves with the minuter forms of animal life. The microscope has opened a new and a wondrous field of investigation, and among so many members of the Club, there are, doubtless, several who are only deterred by bashfulness from becoming contributors to the "Transactions." At the present moment assistance is greatly needed to render as perfect as possible the lists of the Fauna and Flora of this neighbourhood, now in course of preparation by members of the Club.

The following are the Catalogues now being got ready:—

Crustacea, by the Rev. A. M. Norman.
Echinodermata, by Mr. George Hodge.
Birds, by Mr. J. Hancock.
Foraminifera, Mr. H. B. Brady.
Fresh Water Algæ, by Mr. G. S. Brady.
Annelida, do.
Flowering Plants, by Mr. J. G. Baker of Thirsk.

Mr. Baker is perhaps the only naturalist here mentioned who is not well known to the members, but he is an accomplished botanist, and has recently published a most valuable work on the Botany and Geology of North Yorkshire.* The other names we need not recommend; they are all those of distinguished naturalists.

We would especially request attention to the meteorological observations now undertaken by various Natural History Societies. It is only by a combination of many observers that really valuable results can be looked for, and as yet the number of careful records of atmospheric changes kept in this district is scarcely sufficient.

The Tyneside Naturalists' Club now occupies a high and worthy position; but while we feel proud of this prëeminence, let us remember that hard work, and hard work alone, will sustain the Club in the honourable condition to which it has now attained.

The following gentlemen have been elected members during the past year:—

At the Anniversary Meeting:—Messrs. C. O. M'Allum, Newcastle; Joseph Heald, Newcastle; Thomas Crossling, Newcastle; E. C. Davison, Sunderland; Jacob Burnett, Tynemouth; G. E. Crawhall, Durham; Rev. E. Lawson, Longhurst Hall; Messrs. W. B. Ridley, Hexham; T. C. Watson, Heworth Lodge; Joseph Smith, jun., Sunderland; Sir Hedworth Williamson, Bart., Whitburn Hall.

At the First Field Meeting:—Messrs. John Candlish, Sunderand; R. M. Hudson, Sunderland; Rev. R. E. Hoopell, South Shields; Messrs. William Donkin, Quatre Bras; William Ryder, Newcastle; William Wright, Westoe.

At the Third Field Meeting:—Messrs. William Logan, Hetton; E. A. Maling, Sunderland; George May, North Hetton Colliery; J. W. Wayman, Sunderland; A. G. Rolf, Gateshead.

* Since this paragraph was written, Mr. Baker's whole collection, including all the papers and materials relating to the Flora of our two counties, has been destroyed by fire, by which catastrophe we fear that the completion of the Flora is rendered more distant than ever.

At the Sixth Field Meeting:—Hon. and Rev. John Grey Houghton-le-Spring; Messrs. Chas. Grey, Houghton-le-Spring; H. O. Bowman, M.D., Sunderland; W. H. Dixon, M.D., Sunderland; G. H. Hardy, Byers Green; Wm. Brignall, Durham; Richard Heckels, Pensher; T. Fothergill, Bishop Auckland; Rev. W. Greenwell, Harton; Mr. A. M. Davidson, Newcastle.

At the Seventh Field Meeting:—Messrs. Henry Abbes, Monkwearmouth; W. E. Duncan, London; M. M'Intyre, Roker Hotel; William Muschamp, Gateshead.

At the Third Evening Meeting:—Messrs. George Hall, Newcastle; S. S. Robson, Sunderland; Dr. M'Donough, Sunderland; Mr. J. G. Baker, Thirsk.

At the Aniversary Meeting it was resolved,

That the Rules relative to the election of Vice-presidents be cancelled, and that the following be substituted:—"That those gentlemen who have filled the office of President of the Club shall be *ex-officio* Vice-presidents, and that four additional Vice-presidents shall be elected at each Anniversary Meeting; the names of those elected to take precedence on the list. And that the Rule regarding the election of Secretaries be altered to allow of the appointment of *two or more.*

The following places were fixed for Field Meetings for the ensuing year:—

May.....Derwent and Gibside.
June .....Meldon and Mitford.
July .....Fern Islands (or North Sunderland).
August .....Stanhope.
September .....Rosehill.
October .....Marsden.

The Committee were authorized to subscribe the sum of £5 to the fund for deep-sea dredging on the coasts of Northumberland and Durham.

The following propositions from the Committee of the "Natural History Society of Northumberland, Durham, and Newcastle-on-Tyne" (having previously received the careful attention and revision of the Committee and other members of the Club) were read and unanimously adopted.*

TERMS OF AGREEMENT BETWEEN THE NATURAL HISTORY SOCIETY OF NORTHUMBERLAND, DURHAM, AND NEWCASTLE-ON-TYNE, AND THE TYNESIDE NATURALISTS' FIELD CLUB.

1. Members of the Tyneside Naturalists' Field Club may become Associates of the Natural History Society on subscribing each to the latter five shillings annually.

2. Associates shall have free access to the Museum whenever it is open to the public, and likewise to the evening and other entertainments or soirées of the Natural History Society on the same terms as members.

3. Associates shall not attend the business meetings of the Natural History Society, or be elected to any of the offices thereof, except that mentioned in paragraph 4; nor shall they possess any interest in the collections or other property of the Society.

4. Associates may be appointed to act as honorary Curators of the collections of the Natural History Society.

5. The Natural History Society shall provide a meeting room for the Club, and shall warm, light, and clean the same; and shall also provide the necessary bookcases for, and take charge of, the library of the Club. In consideration of which the Club shall pay £10 annually to the Natural History Society; but if the contributions of the Associates exceed £25 per annum, then the rent of £10 to be diminished by the excess, so that if the Associates pay £30, the rent would be £5; if £35, it would be extinguished.

6. The books of the two Societies shall be labelled with their respective labels, and shall be available for the use of the members of both. The books to be circulated under such

* These propositions have since been confirmed, without alteration or amendment, by a general meeting of the Natural History Society of Northumberland, Durham, and Newcastle-on-Tyne, held April 8, 1864.

restrictions as may be adopted by the joint Committee. All copies of works presented to either Society in return for copies of the Transactions shall belong to the Natural History Society.

7. The Transactions shall be published jointly by the two Societies, under the title of "Natural History Transactions of Northumberland and Durham, being papers read at the joint meetings of the Natural History Society of Northumberland, Durham, and Newcastle-on-Tyne, and the Tyneside Naturalists Field Club." The Natural History Society shall have one hundred copies, at cost of production, or such additional number as may be required for distribution to its members, and shall contribute towards the expenses of the Transactions in proportion to the number of copies obtained for this purpose. It shall also defray the cost of all copies now presented, or hereafter agreed to be presented, to societies, public bodies, and distinguished individuals; and shall likewise contribute £10 for extra illustrations. The cost of copies of Catalogues and other papers presented to the authors shall be borne equally by the two Societies.

8. A joint meeting of the Committees of the two Societies, or a Sub-committee appointed at such joint meeting shall determine what papers shall be read at the meetings, and printed in the Transactions; and shall also arrange all matters respecting the co-operation of the two Societies.

9. All papers so approved by the Committees shall be read at joint meetings of the two Societies, to be convened in the evenings during the winter months. But this shall not preclude the reading of all such papers at the Field meetings, if the Committee of the Club shall so determine. Tea and coffee shall be provided at the evening meetings, at the joint cost of the two Societies; a small charge, however, may be made at the door to defray expenses, if thought desirable by the two Committees. The expenses of calling the joint meetings to be borne equally by the two Societies.

10. One of the Presidents of the two Societies, if either be present, shall take the chair at all such meetings; if both are absent, then one of the Vice-presidents of either society shall

preside; and in the absence of both Presidents and Vice-presidents the meeting shall elect a Chairman.

11. The Secretaries of the two Societies shall co-operate in transacting the business at all such meetings; and shall jointly edit the Transactions, or such one or more of them as they shall determine.

12. The address of the President of the Club, list of officers and members, and the Treasurer's accounts shall, as usual, be printed in the Transactions; and likewise, the report of the Natural History Society, together with its Treasurer's accounts, list of officers, members, &c.

13. The whole arrangement to be terminable by mutual agreement, or by six months notice in writing on the part of either Society to the other.

The following gentlemen were elected officers for the year 1864-5:—

PRESIDENT.

Rev. George C. Abbes, M.A.

VICE-PRESIDENTS.

A. Hancock, Esq., F.L.S.
R. S. Newall, Esq.
Rev. A. Bethune.
E. C. Robson, Esq.

Ralph Carr, Esq.
Rev. J. F. Bigge.
Joshua Alder, Esq.
D. Embleton, Esq., M.D.
R. Ingham, Esq., M.P.
Sir W. C. Trevelyan.
T. Sopwith, Esq., F.R.S.
Rowland Burdon, Esq.
J. Hogg, Esq., M.A., F.R.S.
Rev. H. B. Tristram.
George Wailes, Esq.
Rev. W. Greenwell.
Edw. Charlton, Esq., M.D.

TREASURER.

Robert Y. Green.

SECRETARIES.

George S. Brady.
Thomas Thompson.
G. H. Philipson, M.B.

LOCAL SECRETARIES.

Shields, W. H. Brown.
Durham, John Booth.
Hexham, Rev. W. T. Shields.
Morpeth, William Creighton.

COMMITTEE.

Thomas Austin.
Joseph Blacklock.
R. B. Bowman.
H. B. Brady, F.L.S.
E. J. Browell.
James Clephan.
James W. Dees.
Henry George.
John Hancock.
Richard Howse.
Rev. A. M. Norman, M.A.
John Thompson.

AUDITORS.

Henry Turner.
J. S. Foster.

THE TREASURER IN ACCOUNT WITH THE TYNESIDE NATURALISTS' FIELD CLUB.

Dr.				Cr.			
1863.				1863			
To Balance	£41	6	1	By Printing of Transactions, &c.....	£54	4	7
Subscription, Entrances, &c	121	2	0	„ Printing Circulars, &c.	55	18	0
				„ Mr. Forrest, Commission, &c.....	6	14	8
				„ Sundries	11	19	2
				1864.			
				Balance	33	11	8
	£162	8	1		£162	8	1

Examined and found correct,

J. S. FOSTER, Auditor.

NOTICES RESPECTING CATALOGUES NOW IN PROGRESS.

THE publication of catalogues of the various natural productions of the counties of Northumberland and Durham, was one of the chief objects of the originators of the Tyneside Naturalists' Field Club. That it has never been lost sight of, the following list of catalogues already published in our Transactions fully shows:—

Coleoptera, by Jas. Hardy and T. J. Bold.
Mollusca, by Joshua Alder.
Permian Fossils, by R. Howse.
Zoophytes, by Joshua Alder.
Lepidoptera, by George Wailes.
Marine Algæ, by G. S. Brady.
Mammalia, by H. E. Mennell, F.L.S., and V. R. Perkins.

Several other catalogues are now in course of preparation, and the attention of members is requested to the following notes, in the hope that those who have opportunities of collecting specimens or information in any department, will, as far as possible, assist those naturalists who have undertaken the compilation of the catalogues, by the communication either of specimens or observations.

FLOWERING PLANTS AND FERNS; *J. G. Baker, Thirsk.* Lists of localities of the rarer species will be useful. In Watson's "Cybele Britannica," the two counties of Northumberland and Durham make up one of the eighteen "provinces" into which Britain is divided. This is sub-divided into three "sub-provinces," which it is proposed to call Cheviotland, Tyneland, and Durham. The first includes the tract drained by the Coquet and the streams on the north of it; the second the remaining portion of Northumberland; and the third just corresponds with the county of Durham, exclusive of the outlying tracts on the north of the Tyne. In the Cybele six zones of climate are defined, and the plants traced through them. Beginning to count at the warmest, the second, third, and fourth, but not the first, fifth, and sixth, come within our limits. Mr. Baker proposes to regard the contour lines of 300 and 600 yards as the boundaries between the three zones in our own counties, and will be particularly glad of any information respecting the heights of those tracts not yet mapped by the Ordnance Survey. The list of species for the middle zone is extremely incomplete; for the upper one is still almost entirely wanting. *Rubus* is the genus respecting which information is most deficient, especially for Cheviotland and Durham.

FRESH WATER ALGÆ; *George S. Brady, Sunderland.*

Any specimens of these, especially from the streams and ponds in our upland districts, bogs, and moors, will be valuable. They should be sent either as gathered, in a little clear water, or carefully dried upon paper.

FORAMINIFERA; *H. B. Brady, F.L.S., Gateshead.*

ECHINODERMATA; *George Hodge, Seaham Harbour.*

ANNELIDA; *George S. Brady, Sunderland.*

CRUSTACEA; *Rev. A. M. Norman, M.A., Herrington.*

LEPIDOPTERA; *George Wailes, Gateshead.*

COLEOPTERA; *T. J. Bold, Long Benton, near Newcastle.*

HYMENOPTERA; *T. J. Bold.*

HEMIPTERA; *T. J. Bold.*

Specimens of the bugs infesting plants will be acceptable. Almost each plant has its peculiar species of bug; and botanists, at our field meetings and other times, might do good service by collecting and forwarding them to Mr. Bold.

BIRDS; *John Hancock, Newcastle.*

Notices of the occurence of rare species should be forwarded.

FOSSIL FISH, &c.; *J. W. Kirkby, Sunderland,* and *Thomas Atthey, Gosforth.*

Mr. Kirkby will be glad of the opportunity of examining any fossil animal remains which may be found occuring in coal mines or elsewhere.

LIST OF MEMBERS.

JUNE 1ST, 1864.

Abbes, Rev. Geo. Cooper	...	Cleadon Hall.
Abraham, John	...	Liverpool.
Adamson, Charles ...	...	Newcastle.
Adamson, William ...	...	Newcastle.
Adamson, Charles ...	...	North Shields.
Adamson, Henry ...	...	North Shields.
Adamson, Horatio ...	...	North Shields.
Alcock, Samuel, jun. ...	...	Sunderland.
Alder, Joshua	...	Newcastle.
Anderson, Joseph ...	...	Newcastle.
Anderson, Charles ...	...	Cleadon Cottage.
Armstrong, George ...	...	Newcastle.
Armstrong, H. C. ...	...	Newcastle.
Armstrong, Luke, M.R.C.S.	...	Newcastle.
Armstrong, Leonard ...	...	South Shields.
Atkin, David	...	Newcastle.
Atkinson, George C. ...	...	Wylam Hall.
Atkinson, J. J., M.R.C.S.	...	Wylam.
Atkinson, Henry ...	...	Newcastle.
Atthey, Thomas ...	...	Gosforth Colliery.
Austin, Thomas ...	...	Newcastle.
Abbes, Henry	...	Rock Lodge, Monkwearmouth.
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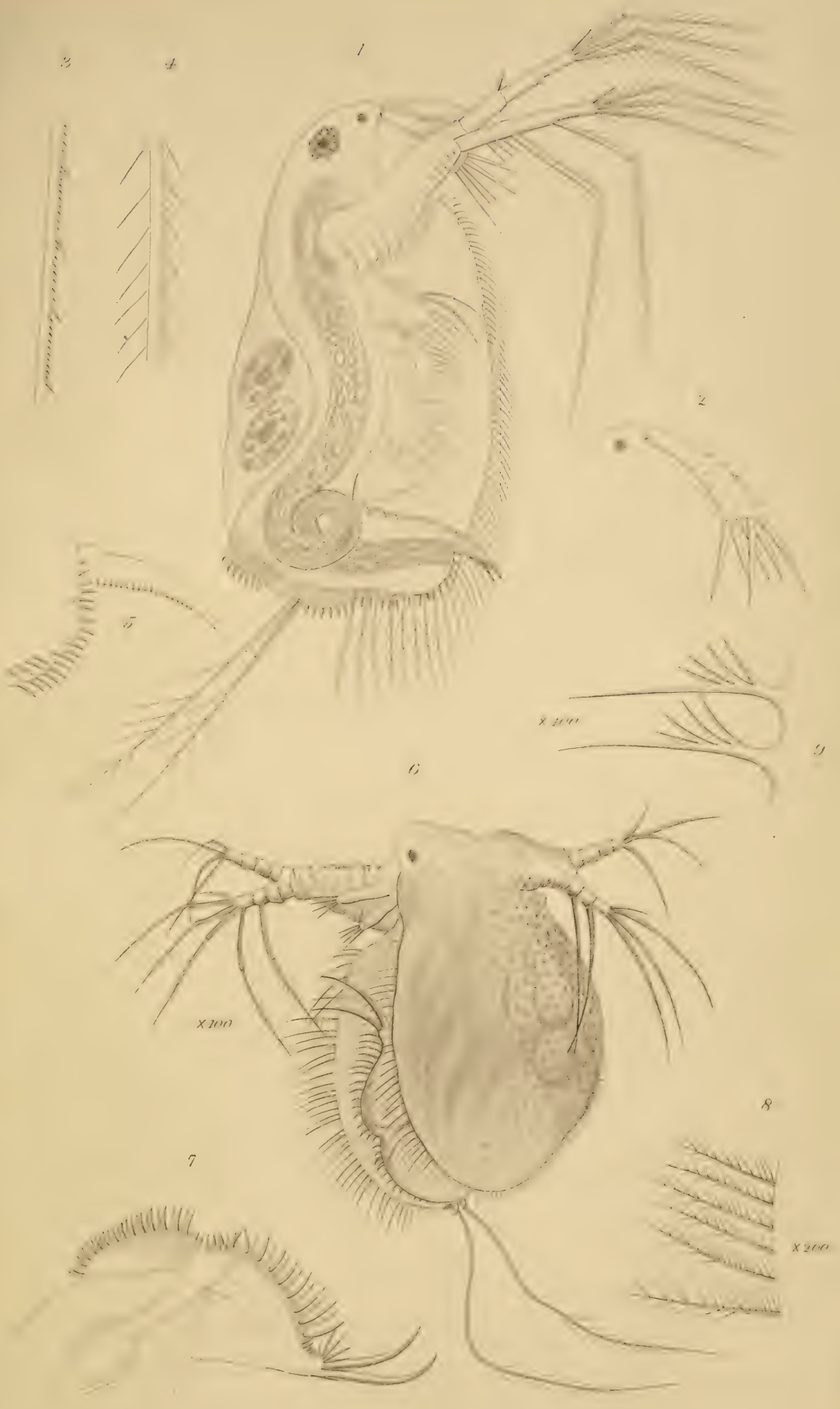
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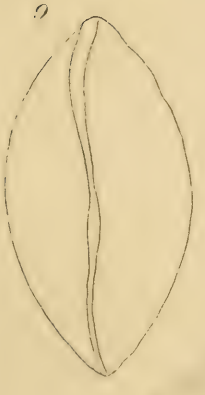
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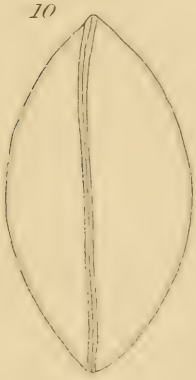
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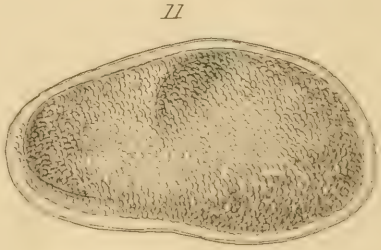
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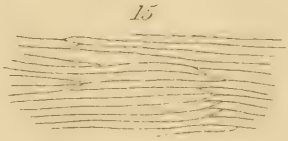
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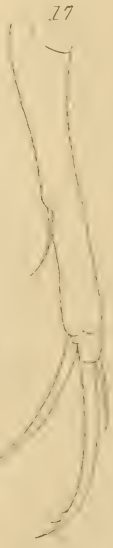
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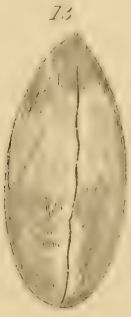
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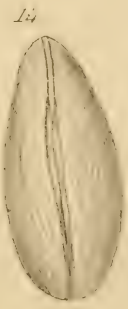
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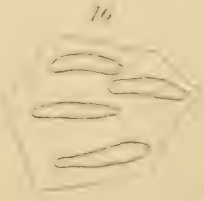
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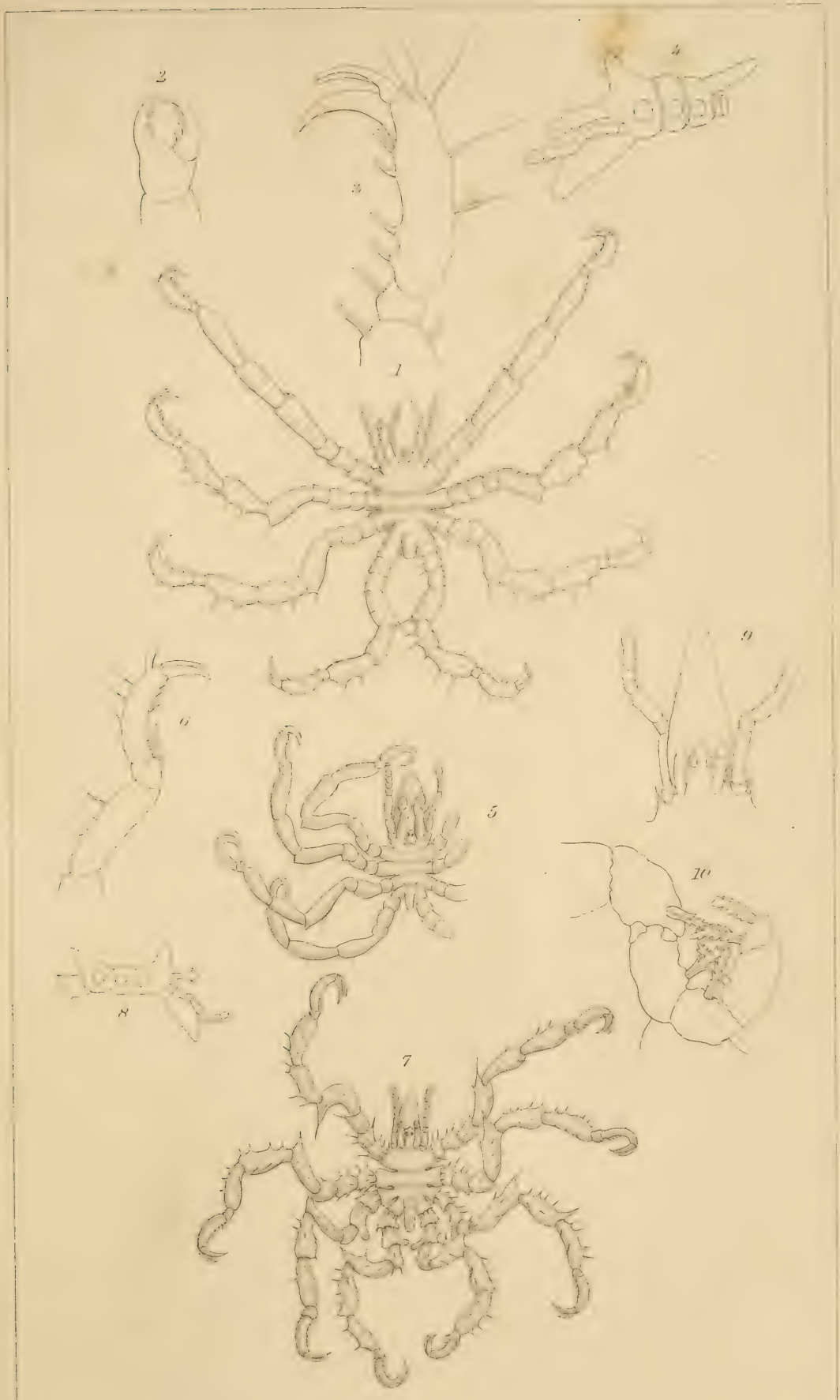

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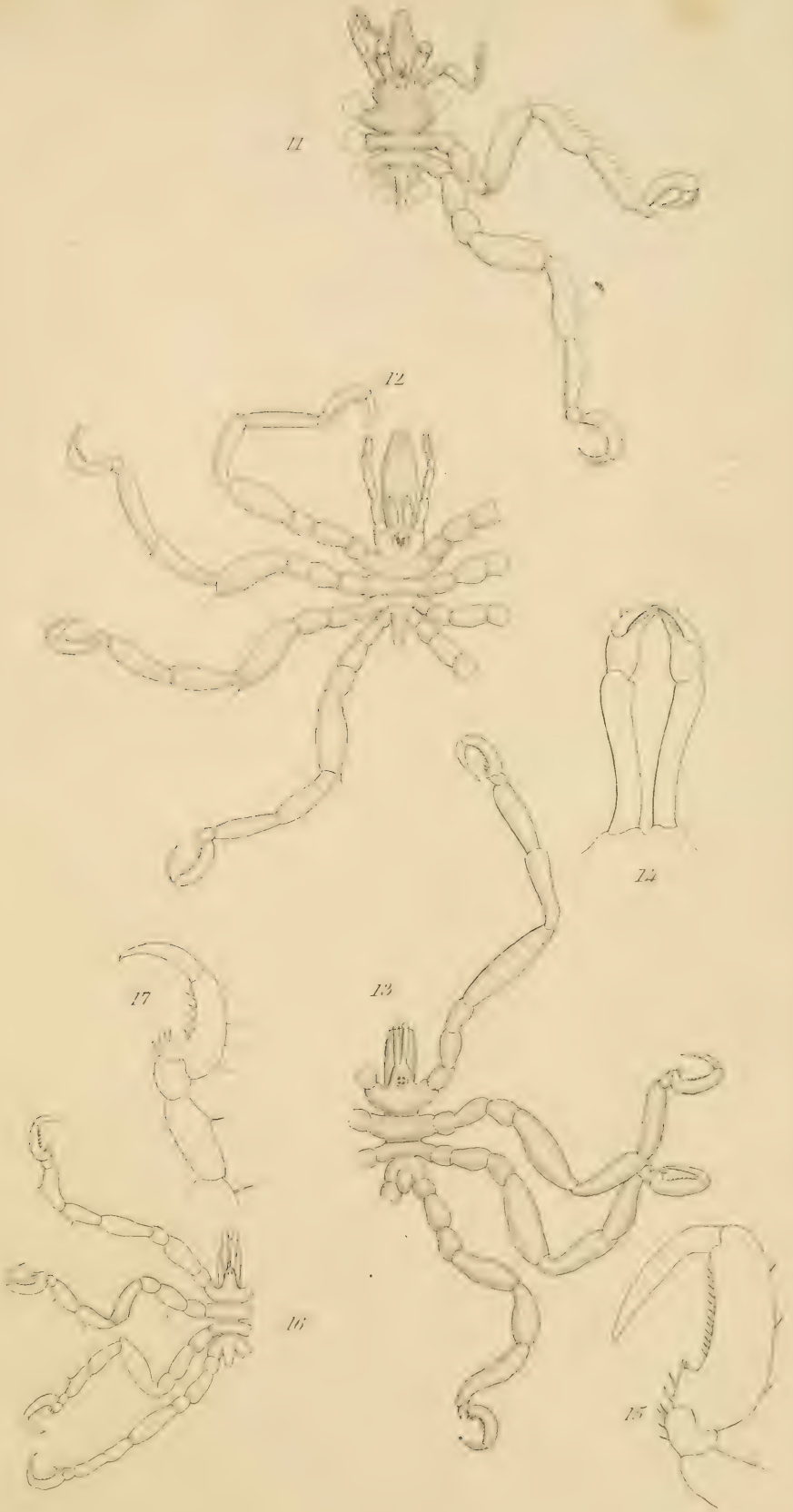

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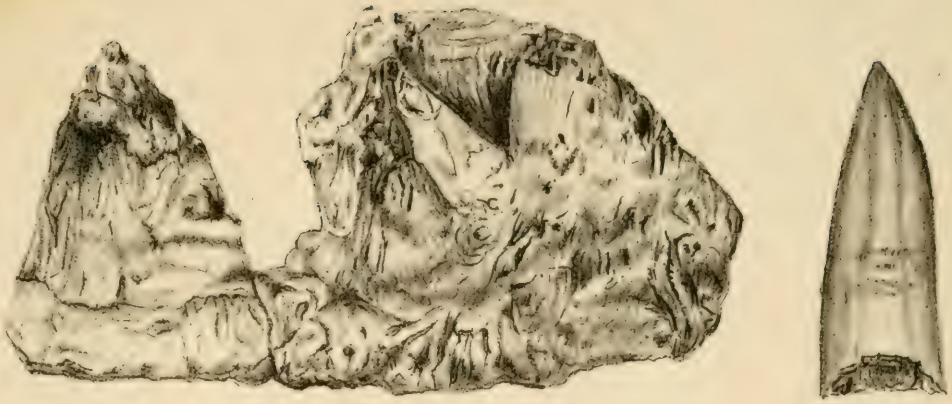

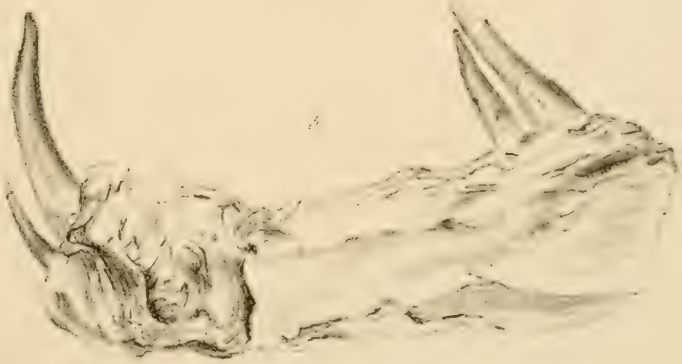

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